BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 57 1960 No. 4

SUMMARY OF RECENT ABSTRACTS *

III. MALARIA †

[Continued from p. 211]

Treatment

ADAMS (p. 1215) gives an account of the drug treatment of malaria in which he points out the great value of chloroquine and amodiaquine for the clinical attack, and of intravenous quinine in cases in which rapid action is imperative. The 8-aminoquinolines are useful for relapsing malaria, and proguanil and pyrimethamine for prophylaxis. After an extensive enquiry in Nigeria BRUCE-CHWATT and HORN (p. 120) report that for treatment of attacks of malaria chloroquine, mepacrine and amodiaquine are favoured in that order; for emergency treatment of severe malaria mepacrine and chloroquine are used, mainly by intramuscular injection, and quinine is also used intramuscularly or intravenously. For prophylaxis proguanil, pyrimethamine and chloroquine are favoured in that order. There is no evidence of resistance of malaria parasites to chloroquine, mepacrine or amodiaquine, but reports on increased tolerance to proguanil or pyrimethamine have been received, though these are indirect and inconclusive. In Malaya WILSON and EDESON (p. 121) found chloroquine the most generally useful drug in acute malaria, followed by amodiaquine, mepacrine and quinine. They stress, however, the importance of treating shock in severe cases by salt and water replacement and presumably by transfusion and other measures. Intravenous noradrenaline should be tried in shock associated with *Plasmodium falciparum* infection, in order to provide time for adjustment of blood volume, blood transfusion, and for the antimalarial drug to do its work.

JEFFERY (p. 117) shows that a single dose of chloroquine, proguanil or pyrimethamine temporarily abolishes infectivity to mosquitoes in a substantial

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1959, v. 56. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on malaria in this series, see the March and April issues of the *Tropical Diseases Bulletin* each year since 1939.

proportion of persons infected with *P. vivax*. Sodium bismuth thioglycollate has a pronounced effect in this way.

In some countries chloroquine has been given in the form of rectal suppositories to children with malaria, but in a trial in Nigeria BRUCE-CHWATT and GIBSON (p. 688) found this much slower than oral chloroquine. It should not be used where speed of action is important, but it might be useful in special circumstances.

In discussing the findings in a young man who committed suicide by swallowing about 66 tablets [each normally 200 mgm.] of nivaquine, PILLE *et al.* (p. 412) conclude that in excessive dosage it is more toxic than mepacrine. In another case of suicide by chloroquine (2·6 gm.) NEMERY DE BELLEVAUX and VANDERICK (p. 412) report that death took place in less than 2 hours.

LOZANO MORALES and VELAZQUEZ GAZTELU (p. 689) find 2 doses of 600 mgm. amodiaquine at an interval of 6 hours satisfactory in *P. vivax* infections, though there have been some relapses.

YOUNG and BURGESS (p. 690) treated persons infected with *P. vivax* with single doses of pyrimethamine ranging from 25 to 200 mgm. repeated at intervals of a few weeks. Although schizonts were killed, relapses occurred and resistance soon became evident. Similarly the same authors (p. 691) found that resistance may appear to *P. falciparum* after a single dose of 25 mgm., and, as with *P. vivax* also, resistance persisted after mosquito transmission. SMITH and IHRIG (p. 691) show that pyrimethamine is only slowly excreted. A synergic action of primaquine and pyrimethamine on *P. vivax* and *P. falciparum* infections was observed by SOBERÓN Y PARRA *et al.* (p. 689), who used single doses of each drug which were considerably less than the accepted minimum effective doses.

A metabolite of bromoguanide (M.I.S. 11) has shown promise against *P. falciparum* and *P. vivax* and SIRSI and BAMI (p. 10) give an account of its pharmacological properties.

RATHSCHECK (p. 921) writes favourably of Propoquine in human malaria.

In India RAY *et al.* (p. 1106) found that the drug known as 377 C 54 (belonging to the series of mono- and dihydroxynaphthalenes) was about as effective, in single doses of 600 mgm., as the 4-aminoquinolines; its action on gametocytes, however, was extremely slow.

GREWAL (p. 120) observed that saponin had a greater effect in haemolysing rabbit erythrocytes if the animals had previously received injections of quinine dihydrochloride than if they had not been so treated. Quinine appears to render the cells more susceptible to this form of lysis.

Chemoprophylaxis

BRUCE-CHWATT (p. 1216) points out the need for simple tests to assess the amount of antimalarial drugs or their metabolites in the urine, and gives details of a number of quantitative tests which may be useful to estimate whether people are in fact taking the drugs advised, especially in mass chemotherapy programmes.

Experiments with volunteers indicated that the use of salt containing chloroquine or pyrimethamine, in carefully calculated amounts according to the quantities normally taken in food, was effective in suppressing sporozoite-induced *P. vivax* malaria (COATNEY *et al.*, p. 122). In pregnant women given

chloroquinized salt for the prevention of congenital malaria in their offspring SOARES *et al.* (p. 412) mostly found equal distribution in the maternal and foetal blood, but there was very little in the milk. They also studied excretion, which was inversely proportional to the size of the dose.

In a village in the Cameroons SCHNEIDER *et al.* (p. 413) gave some children 75 mgm. chloroquine base plus 6·25 mgm. pyrimethamine each week, others 25 mgm. pyrimethamine alone, and others 300 mgm. chloroquine base alone. At the height of the malaria season the parasite index rose to 35% and 21·8% in the first 2 groups but was much lower in the third. The authors recommend that pyrimethamine should not be used either alone or in combination if chemoprophylaxis is to be carried out for more than 3 months.

JONES (p. 513) attempted to control malaria in an African community in Kenya by administration of pyrimethamine every 6 months (or more frequently in children). The outstanding result was the emergence of resistant strains of *P. falciparum*—one child carried a resistant strain from the beginning. Resistance was much less common in *P. vivax* and *P. malariae*. In a highly malarious area of Tanganyika CLYDE (p. 692) observed that regular chemoprophylaxis improved the general health and efficiency of schoolchildren to some extent and did not interfere with immunity when continued regularly for 20 months. He gives the doses of the various drugs used.

In part of Venezuela where residual spray had failed to eradicate malaria GABALDON and GUERRERO (p. 1217), having found that distribution of chloroquine failed to prevent fresh infections, gave pyrimethamine once each week to the population with good results, though relapses occurred on cessation of the programme. They consider that a longer period of administration might lead to eradication. Transmission had been taking place out of doors.

Control

In the report of the WHO Expert Committee on Malaria (p. 921) attention is paid to the evaluation of eradication campaigns (which demands an approach different from that of measurement of a known prevalence), to resistance of anophelines to insecticides, and to the use of drugs in eradication campaigns. It should be read in full.

JONES (p. 274) shows that ether (especially) and carbon dioxide interfere with the action of DDT on fourth-stage larvae of *A. quadrimaculatus*.

REHM *et al.* (p. 515) show that the action of dieldrin on anopheline larvae is twofold; there is an immediate effect and there may also be considerable mortality in the later stages of the life cycle, some days after exposure is stopped.

GAHAN and LABRECQUE (p. 803) report on the effectiveness of chrysanthemumates and certain organophosphorus compounds against *Anopheles quadrimaculatus*. LEWALLEN (p. 804) shows that certain organophosphorus insecticides have considerable toxicity for *Gambusia*.

In a survey of malaria control problems in Italy BUONOMINI and COLUZZI (p. 122) conclude that eradication of vectors by residual insecticides is not probable; malaria is now rare but has not disappeared. D'ALESSANDRO and MARIANI (p. 515) report experiments on the exposure of larvae of *A.m. atroparvus* to DDT, the tolerance shown and its relationship to the chromosome order.

BELIOS (p. 123) and LIVADAS (p. 1217) report on the enhanced malaria programme in Greece, which includes widespread radical treatment for *P. vivax* infections, surveillance and entomological procedures, repetition of insecticide spraying, the use of larvicides and even more conservative measures to prevent breeding. Malaria is practically eradicated from Crete and the greater part of Epirus, but foci remain in north and west Greece. *P. falciparum* appears to be extinct. The reaction of *A. sacharovi* to insecticides may be one of tolerance rather than true resistance.

In Rumania DUPORT *et al.* (p. 593) found that with both DDT and BHC the kills of local anophelines (*A. maculipennis*, *A.m. messeae*, *A.m. atroparvus* and *A. sacharovi*) were much higher in August than in October. The physiological state of the mosquitoes may be a factor in this, but temperature is probably a stronger influence. In the flood plain area of the Danube basin in Rumania malaria incidence was about 7·2% in 1949 (with values up to 33% in places), but RADACOVICI *et al.* (p. 1007) show that after a large-scale insecticide campaign, begun in 1949, the incidence was reduced to 0·01% in 1953. Similar success in rice-growing areas is reported by LUPASCU *et al.* (p. 1007).

CAYLA (p. 1218) gives some account of the importance of malaria in Turkey, and of a scheme of eradication designed for use in the 3 main epidemiological zones.

MANSUROV and ZUFAROV (p. 273) claim complete eradication of malaria in a district of the Samarkand region where the disease had been stable, associated with rice fields. DDT and BHC were used, with proguanil as a prophylactic; the mosquito mentioned is *A. sacharovi*.

DAGGY (p. 1213) gives an account of malaria in oases of eastern Saudi Arabia, where several species of anophelines exist, of which *A. stephensi* is considered to be the sole vector. Malaria control with DDT was started in 1948 and when the vector became resistant, dieldrin was substituted and control was established. The author, however, suggests that if the vectors again become resistant, it may be necessary to revert to the old methods of control of breeding by larvicides, water control, drainage, filling and similar methods.

In an account of the antimalaria campaign in the South Cameroons CHASTANG (p. 1008) explains that in the forest areas where the natural vectors are *A. moucheti* and *A. nili*, and where *A. gambiae* and *A. funestus* are superimposed on them, much success has been attained by spraying, but parasites persist in infants and children. In more open country the results have been much less satisfactory. Many difficulties are experienced here, and to be successful the measures would need much elaboration. In Douala, French Equatorial Africa, VOELCKEL and MOUCHET (p. 1108) instituted a very thorough campaign of DDT or dieldrin spray twice in the year, with periodical insecticide fogging to kill exophilic mosquitoes, with the result that no anophelines could be found in houses, *A. gambiae* was almost gone, *A. nili* and *A. funestus* were absent, but *A. coustani* and *Culex pipiens fatigans* remained. *Tunga penetrans* also disappeared. The spraying was the important factor.

In the annual report of the East African Institute of Malaria and Vector-borne Diseases (p. 588) there is an account of the progress in the Taveta-Pare control scheme in which there has been a great reduction in the anopheline population, and in the malaria rate in man, in the area subjected to repeated treatment with insecticides. There is, however, a continuing low level of

infection (2–4%) in infants, which is not entirely explained by migration. *A. gambiae* has not become resistant to dieldrin. In Tanganyika a mountainous area adjoins a plain and in the plain dieldrin spraying has been carried out for 3 years, with the disappearance of *A. funestus* and the great reduction of *A. gambiae*; SMITH (p. 515) observes that these mosquitoes have almost disappeared from the (unsprayed) mountain areas also, which suggests that the mountainous areas are directly infested from the plains, strong winds playing an important part.

In the Dar-es-Salaam area of Tanganyika YEO and WILSON (p. 1219) used a granulated formulation of dieldrin for application as a larvicide from aircraft during April–July 1957, and searches made for larvae and adults in the area suggested a very great reduction in the breeding of *A. gambiae* and *A. funestus* at the critical periods of the year. Previously DDT solutions had been used but there had been only imperfect results, possibly because droplets were caught by vegetation; it was hoped that dieldrin granules would overcome this.

ALVES (p. 13) gives an account of investigations in Southern Rhodesia which indicated that the sustained campaign of residual insecticide spraying has been remarkably successful. Modern practice is to concentrate on the periphery of the treated area, leaving the formerly well-treated centre untouched. Larvae of *A. gambiae* could still occasionally be found, but few adults were present in houses, and there was little overt malaria.

DDT has been widely used in South Africa, with the object of controlling (not eradicating) malaria, and marginal areas and small foci have been left untreated; HECHTER-SCHULZ (p. 14) concludes that with some extra effort this could be converted to an eradication scheme at reasonable cost. In Northern Transvaal malaria has either been eradicated or rendered hypoendemic, whereas once it was widely prevalent. BRINK (p. 14) describes the organization set up to achieve control. DDT and BHC are used and *A. funestus* has been cleared, leaving *A. gambiae* as the only important vector. Mass chemoprophylaxis with chloroquine or pyrimethamine is also employed. In the Transvaal spraying of huts with BHC remains effective for 6 months; STEYN *et al.* (p. 1219) give biological data on *A. gambiae* relevant to control by BHC.

JASWANT SINGH *et al.* (p. 414) report on the national malaria control programme in India, 1953–56, during which 78 million houses were sprayed and the incidence of clinical malaria fell from 61 to 37 million per annum, and the parasitaemia rate was reduced to one-third of its former level. Records of mosquito densities are included in the original report. In Bengal, where *A. philippinensis* is the vector and the transmission season begins in July and lasts for 6 months, SEN (p. 420) found that spraying in October–November is not conducive to reduction of malaria, and advocates a single massive dose of 112 mgm. of DDT per square foot or 2 doses of 90 mgm. (which are more effective) applied early in the season.

In a group of tea estates in Assam SCOTT (p. 594) controlled malaria (carried by *A. minimus*) by BHC spray repeated at intervals of 4–5 or 6–7 weeks. He emphasizes the importance of spraying early, before transmission starts in spring. In Assam tea estates GILROY (p. 693) found that chemoprophylaxis was only moderately successful because the drug (proguanil) was not regularly taken, but he instituted a campaign of BHC spraying at intervals not exceeding 6 weeks (because many houses were replastered between sprayings) and observed a very substantial reduction in malaria, compared with adjacent

villages not subject to his control. Some persistence of infection was found when blood films from infants were repeatedly examined, and GILROY and SCOTT (p. 694) attribute this to infection from the uncontrolled villages.

From a detailed study of vital statistics in 3 representative areas of Ceylon KARUNARATNE (p. 1218) concludes that since malaria control was instituted there has been an unprecedented reduction in death rates at all ages, but in particular among women of child-bearing age. This leads to the conclusion that directly or indirectly malaria had previously greatly increased the risks of maternity.

In discussing malaria control in Malaya REID and AHMAD (p. 15) point out that for urban malaria antilarval measures predominate, and for rural malaria the residual insecticides and prophylactic drugs are used. There has been a dramatic reduction, but the aim should be eradication, though it remains to be seen whether this is possible. In a small island off Malaya DOWLING and HUGHES (p. 1109) used dieldrin, and treatment with chloroquine followed by proguanil, and conclude that this combination might hasten eradication.

In part of Java DDT, used for several years, was found unsuccessful in controlling *A. sundaicus*, the principal vector, and dieldrin was used later. SUNDARARAMAN (p. 275) comments that this species is anthropophilic, endophagous and largely endophilic in habit, but in the long-treated areas, as a result of contact with DDT, the mosquito population has become increasingly composed of individuals which do not tend to rest on indoor walls, and they remain in high densities, anthropophilic and endophagous but exophilic. Control is therefore difficult, and may depend on drugs and antilarval measures.

In part of Netherlands New Guinea DDT spraying reduced malaria but did not totally interrupt transmission, and VAN DIJK (p. 1009) therefore instituted mass treatment for 8 weeks with chloroquine given once each week. There was a marked and sustained reduction in infection with all species in the villages in which the scheme was carried out fully, and this reduction was evident a year later. In Netherlands New Guinea dieldrin has proved less useful than DDT as a residual insecticide; VAN DEN ASSEM (p. 1221) considers that it is not possible to eradicate the malaria vectors by indoor dieldrin spray alone, though there was no evidence of resistance in *A. farauti* and *A. bancrofti*. In Papua PETERS and STANDFAST (p. 1110) used dieldrin against the *A. punctulatus* group, without development of resistance.

From the Taiwan Provincial Malaria Research Institute, and WHO (p. 415) there is a report on the control programme in Taiwan which in 1954 was revised to aim at eradication, though this has not yet been achieved. DDT and BHC are used. Malaria has almost disappeared, but a few cases are still found in which infection was probably contracted locally, and although *A. minimus* has almost been eradicated, it has been found able to persist in woodland areas in the absence of man. Details are given of the control organization which has been developed.

MATHIS and SCHOOF (p. 803) show that malathion and parathion were effective against *A. quadrimaculatus* susceptible or resistant to dieldrin, either alone or mixed with dieldrin or DDT. EPN with DDT was rather less effective, and DDT alone was much less so. JONES (p. 1221) gives details of the effects of dieldrin on *A. quadrimaculatus*, which should be sought in the original.

In the Annual Report of the Malaria Division of Trinidad and Tobago for 1957 (p. 417) it is pointed out that in some areas *A. bellator* is as important

a vector as *A. aquasalis*, and control of this has not been achieved; malaria eradication in *A. bellator* areas must depend partly on chemotherapy. Details are given of the use of insecticides, and of copper sulphate in the areas where bromeliads (and therefore *A. bellator*) are found.

Malaria was eradicated from the coastal areas of British Guiana in 1945–50, and GIGLIOLI (p. 1047) quotes figures to show the remarkable fall in infant mortality which accompanied eradication; the nutritional state of the people, however, leaves room for improvement. In discussing malaria eradication programmes (as in British Guiana) SWELLENGREBEL (p. 1107) observes that as malaria decreased the medical staffs were able to give more individual attention to patients with other diseases, hospitals became overloaded, and home visiting became more common. This home contact is of great importance and ensures that any recrudescent malaria would be observed; it constitutes the fourth, permanent, phase of eradication but is integrated into a general organization. It has many social advantages. From French Guiana FLOCH (p. 124) reports that *P. falciparum* has disappeared and that all the patients with malaria now seen are suffering from relapses. There is a risk of malaria being introduced by immigrants, and those from malarious areas are given suppressive treatment with a schizontocide and a gametocide. Further insecticide campaigns are planned.

A. albimanus from villages sprayed with DDT have been reported to be hyper-irritable and to avoid sprayed surfaces; BROWN (p. 923) reports experiments which showed that this was significantly different from the irritability shown by the same species taken in unsprayed areas.

VARGAS *et al.* (p. 416) give an account of the malaria campaign in Venezuela where the basic unit is the "working area" with its team of 4 spraying officers capable of spraying 9,000 houses in the year. These areas are grouped into sectors, sections and zones, and there is a special Evaluation Office at the highest level.

No evidence of resistance to DDT or dieldrin could be found in *A. pseudopunctipennis* by ACOSTA (p. 1110) in western Peru.

Resistance to Insecticides

DAVIDSON (p. 419) discusses the inheritance of resistance of anophelines to insecticides, and CIUCĂ *et al.* (p. 922) discuss resistance of anophelines as observed in Rumania.

DDT

GARMS *et al.* (p. 1107) investigated the seasonal variation in susceptibility to DDT of *A. m. atroparvus* and *A. m. messeae* caught in North Germany. Susceptibility was reduced at the onset of hibernation, and this was probably due to increased fat body and changed metabolism associated with gonotrophic dissociation. MOSNA *et al.* (p. 692) observed that increased tolerance of DDT arose in a colony of *A. m. atroparvus* exposed at various stages to the insecticide. They discussed how resistance occurs, and relate it to changes in chromosome arrangements. The paper should be read in full. VUKASOVIC *et al.* (p. 1008) report on the resistance of *A. m. messeae* to DDT in Serbia, and GÖKBERK (p. 804) on a high degree of resistance to DDT in *A. sacharovi* and the *A. maculipennis* complex in parts of Turkey.

GRAMICCIA *et al.* (p. 516) found resistance in *A. stephensi* in southern Iraq, and SHARMA and KALRA (p. 420) in *A. subpictus* in Delhi State. COLUZZI and RUGGIERO (p. 124), however, found no resistance in *A. gambiae* in Somalia, and neither did RACHOU and his colleagues (p. 125) in *A. cruzii* in 8 years of spraying, but *A. darlingi* taken on human bait showed some tolerance to it.

BHC, Dieldrin

In experiments on strains of *A. gambiae* which were resistant to dieldrin and BHC (there being cross-resistance to these insecticides), or susceptible to them, or hybrids, DAVIDSON and POLLARD (p. 273) observed that gamma BHC was more effective than dieldrin in killing the hybrids, and they conclude that BHC continues to be lethal to hybrids and that when it is used there is a delay in the appearance of resistant strains. ARMSTRONG *et al.* (p. 419) surveyed the population of *A. gambiae* in Western Sokoto, and found exceedingly high proportions of homozygous resistant forms in areas sprayed with dieldrin or BHC. But even more interesting was the finding of heterozygous *A. gambiae* in areas far outside the sprayed areas, which indicates that resistant *A. gambiae* is far from rare in unsprayed populations in that part of Africa. In part of Nigeria RAMAKRISHNA and ELLIOTT (p. 804) found that resistance levels of *A. gambiae* to insecticides vary considerably in different villages, resistance to BHC being generally consistent with the spraying history of the place. Where BHC had been used for 2½ years the mosquito population appeared to be homozygous for dieldrin-BHC resistance and also to possess an additional minor factor specific for BHC. There was no sign of cross-resistance to DDT.

HAMON *et al.* (p. 12) report some degree of resistance to dieldrin in *A. gambiae* found in villages of Upper Volta; it was most marked in 2 villages treated 2 years before, one with BHC and the other with DDT. ADAM *et al.* (pp. 419, 1220) in French West Africa have tested the susceptibility of *A. gambiae* to dieldrin, and have extended to the Ivory Coast the known boundaries of distribution of the gene of resistance, for the first time in a coastal area. The mosquitoes, however, were highly susceptible to DDT.

In East Africa ARMSTRONG (p. 516) could find no evidence of resistance in *A. gambiae* after prolonged spraying of the area with DDT, BHC or dieldrin.

ELLIOTT (p. 418) describes a method for investigating the susceptibility of anopheline larvae to insecticides. A strain of *A. gambiae* resistant to DDT and BHC was very tolerant to dieldrin, and only one organic phosphorus insecticide, parathion, was effective against dieldrin-resistant larvae of *A. gambiae*.

MOSNA *et al.* (p. 11) compared the chromosome arrangements of a strain of *A. m. atroparvus* which had been subjected to dieldrin for several generations with those of a control strain, and found certain differences, which they describe.

In part of Mexico where DDT and dieldrin were widely used MARTINEZ PALACIOS (p. 517) observed resistance to both (but especially dieldrin) in *A. pseudopunctipennis pseudopunctipennis*. On the other hand *A. albimanus* was susceptible.

In Trinidad OMARDEEN (p. 517) found a very high proportion of *A. aquasalis* resistant to dieldrin.

Malaria of Mammals

Monkeys

RAY and SHARMA (p. 126) investigated liver injury in experimental monkey malaria. Plasma from heavily infected animals can cause fatty parenchymal changes on injection into normal monkeys, and this is prevented when choline is administered. After bilateral resection of part of the sympathetic chain in animals infected with *P. knowlesi*, necrosis of liver cells was absent but there were fatty changes and swelling. There may be a "sphincter" mechanism in the hepatic venous tree, arising from some stimulus transmitted through the sympathetic chain, which would explain these findings. In infection of *Macaca mulatta* with the Nuri strain of *P. knowlesi* DEVAKUL and MAEGRAITH (p. 276) found a marked fall in blood sugar when death is approaching, and a great reduction in liver and muscle glycogen values. There may be competition between host and parasite for the available glucose.

GARNHAM *et al.* (p. 694) give an account of the life cycle of *P. gonderi* and its sporogony in *A. aztecus*. Details are given in the original abstract.

Rodents (P. berghei, P. vinckei, etc.)

RADACOVICI *et al.* (p. 420) describe experiments on *P. berghei* in mice, hamsters and rats. In a series of papers FERNÁNDEZ NAFRIA (p. 128) describes the course of experimental *P. berghei* infection; the main points are well known, and are detailed in the original abstract. GREENBERG and KENDRICK (p. 421) describe the course of *P. berghei* infection in 2 strains of mice and in their hybrids. In passage work on *P. berghei* in mice CARRESCIA and ARCOLEO (p. 129) found that frequent passage increased its virulence, as manifested by a rise in the proportion of infected normocytes, whereas in delayed passage there was a higher proportion of infected macrocytes.

SERGENT (p. 129) states that in the first 2 days of *P. berghei* infection in mice there is rapid destruction of mature erythrocytes, and these are replaced by immature red cells whose cytoplasm is soft and membrane is fragile; these features probably facilitate penetration by the parasites, but they do not provide a favourable medium for development, since many of the parasites degenerate and disintegrate. Shock occurs 5–7 days after infection of mice with *P. berghei*, and FABIANI *et al.* (p. 130) found low platelet counts and low cholinesterase activity in infected mice which died of shock; they conclude that these factors were involved. Shock does not occur in splenectomized mice or mice infected with *P. vinckei*.

COX (p. 806) shows that if Swiss mice infected with *P. berghei* are treated with mepacrine they may withstand the first wave of parasitaemia and develop immunity, to respond to the infection in the same way as rats. BOX and GRINGRICH (p. 695) report to the same effect, but show that splenectomy after drug treatment renders them susceptible to reinfection, which is fatal.

DEMINA (p. 277) gives an account of the transmission of immunity from female rats infected with *P. berghei*, to their young through the placenta and milk. COWPER and WOODWARD (p. 595) note that the multimammate rat *Rattus natalensis erythroleucus* is a particularly suitable animal for infection with *P. berghei*. Working with white rats, BOUISSET and RUFFIÉ (p. 16) found that deprivation of vitamin A exacerbated infection with *P. berghei*, and the rats died, whereas control rats completely recovered in a short time.

ADLER (p. 17) found that in mice infected with *P. vinckei* the parasites did

not develop if the animals were kept on a meat diet, even if splenectomized, but that if they were given *p*-aminobenzoic acid the infection developed in the usual fatal way. Mice on a meat diet developed severe anaemia which could be prevented or cured by adding liver, but not by giving vitamin B12 or folic acid. In mice receiving liver the infection is fatal.

ZUCKERMAN (p. 696) gives an account of blood loss and replacement in *P. vinckei* infection of weanling and mature rats. *P. vinckei* causes only a mild infection in intact white rats, but after splenectomy it is much more severe, especially on second infection and in animals infected soon after splenectomy (FABIANI *et al.*, pp. 595, 806).

VAN DEN BERGHE *et al.* (pp. 696, 697) discuss the sexual and asexual cycles of *Plasmodium atheruri*, a parasite of the porcupine in the Belgian Congo.

Malaria of Birds

SERGENT (p. 1111) sums up his work on infection and resistance in malaria (chiefly *P. relictum* and *P. berghei*) and on the behaviour of plasmodia in mosquitoes—which fail to react to the presence of these invaders. Premunition is discussed, with the observation that it may exist between related species.

In an extensive monograph MOHAMMED (p. 421) describes work done on the protozoal blood parasites of Egyptian birds.

HUFF (p. 1010) reports work on host-cell preferences by exo-erythrocytic stages of bird malaria parasites, which should be read in full.

RAMA RAO and SIRSI (p. 17) have investigated the effect of *P. gallinaceum* infections on amino acids in various tissues in chicks. Amino acids were markedly increased in red cells, and this may be significant for the nutrition of the parasites. OKPALA (p. 807) shows that *Aëdes stokesi* may develop oöcysts and sporozoites of *P. gallinaceum*. Gametocytes of malaria parasites tend to lose infectivity to mosquitoes during the course of the infection, and HUFF *et al.* (p. 806) as a result of experimental work with *P. gallinaceum* attribute this to the development of immunity. The decline in infectivity occurs long before the immunity has influenced the asexual forms.

Some workers have found that a plasmodial infection is harmful to mosquitoes, but others have not, and RAGAB (p. 595) failed to find an adverse effect in infection of *Aëdes aegypti* with *P. gallinaceum*.

SEN GUPTA *et al.* (p. 596) investigated the action of a metabolite of bromoguanide in the blood of fowls on the development of *P. gallinaceum* in *Aëdes aegypti* fed on them. There was some reduction in sporozoites and oöcysts in mosquitoes fed 4–8 hours after the drug had been administered, but after that there was no effect. From experiments on *P. gallinaceum* and *P. knowlesi* SEN GUPTA *et al.* (p. 596) conclude that Compound 377 C 54 (a naphthalene compound) is more active than quinine but less effective than chloroquine. YAO and TANG (p. 807) investigated a number of various halogen substituted derivatives of dichlorophenyltriazine (related to proguanil), all of which showed activity against *P. gallinaceum*.

MCGHEE (pp. 279, 697) discusses the reproductive behaviour of *P. cathemerium* in duck and chick embryos, and the effect of reduced temperature on its development.

HUFF *et al.* (p. 808) discuss the susceptibility and resistance of avian and mosquito hosts to *P. relictum*. *C. tarsalis* proved a good host.

TRAGER (p. 278) has been able to keep *P. lophurae* alive in culture medium

for 3 days in the absence of red cells, and has observed that folinic acid has a favourable action on this parasite and on *P. falciparum* when grown intracellularly. He (p. 1111) found that in *P. lophurae* infections of ducks the folic-acid and folinic-acid content of erythrocytes was greatly increased over the normal values. The malaria parasite thus appears to affect markedly the metabolism of the host cell. An account of the antimalarial effectiveness of amopyroquine (Propoquine) in *P. lophurae* infection of chicks is given by THOMPSON *et al.* (p. 130); its potency is close to that of amodiaquine.

LAIRD and LARI (p. 278) report on *P. circumflexum* and *P. vaughani* found in birds in East Pakistan.

Other Parasites of Animals

BAUER and HOHORST (p. 131) failed to find evidence of development of *Hepatocystis kochi* in *Aëdes aegypti* or monkey lice. GARNHAM (p. 132) reports a parasite, which he names *Hepatocystis hippopotami*, from a hippopotamus. *Charles Wilcocks*

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

BASTIANELLI, G. Il globulo rosso e il metabolismo del parassita malarico. [**The Red Cell and the Metabolism of the Malaria Parasite**] *Riv. di Malariologia.* 1959, June, v. 38, Nos. 1/3, 9–26, 4 figs.

This is the last scientific paper of the great Italian malariologist who died on March 30th 1959 in Rome. It represents a lecture given to the Course of Malariology in 1951, and bears witness to his interest in and expert knowledge of biochemistry up to the latest years.

The first part of the paper is devoted to a summary of the cytochemistry of erythrocytes from the earliest erythroblast to the reticulocyte and finally the mature red blood cell. Most attention is given to the haemoglobin constituent which forms about 34% of the body of the cell in the form of a gel or 95% of the dry material, and its constitution and structure are clearly demonstrated. The average life of an erythrocyte is 120 days, and throughout this period it is engaged in the conversion of glucose to lactic acid in the Embden-Meyerhof cycle.

When malaria parasites grow in erythrocytes, the metabolic rate is enhanced with increased oxygen consumption and the conversion of the ferric element of the haemoglobin into ferrous iron, as shown by well-known experiments with *Plasmodium knowlesi* in monkeys; similar results were obtained with *P. gallinaceum*. The chemistry of the invaded cell is then briefly reviewed—rise in the phosphorus, adenosine triphosphate, phospholipids, fatty acids, adenine etc., and the conversion of haemoglobin into haematin. The state of

nutrition of the host plays a part in the growth of the parasite, for infections in monkeys which have been deprived of ascorbic acid develop only slowly; growth reverts to normal if ascorbic acid, methionine or paraaminobenzoic acid is added to the diet. *P. C. C. Garnham*

See also p. 421, HUANG *et al.* [**Studies on the Feeding Habits of Mosquitoes in Foochow**].

PIGANIOL, G. & COUCHE. Considérations sur le paludisme des rapatriés. [**Observations on Malaria in Repatriates**] *Bull. Soc. Path. Exot.* 1959, July–Aug., v. 52, No. 4, 497–503.

It is exceptional to find stable malaria in persons repatriated from endemic areas. In 1958, 154 malaria patients who were applying for pensions on account of malaria were examined in Dijon. The clinical examination was naturally directed towards splenomegaly together with microscopic blood examination and blood counts but latterly serological methods, those of Chorine and Henry, were employed.

Most of the applicants were under 30 years of age. In 24 the malarial history was less than one year, in 17, 1–5 years, but in 97 it was over this latter figure; in the remainder it was unknown. In only 24 of the whole number was it possible to demonstrate malarial parasites: in 20 it was *Plasmodium vivax*, in 3 *P. falciparum* and in 1 it was mixed. As regards rigors 36 patients had them rarely, 20 had one or two yearly, 51 had very frequent rigors, 47 had none at all. The general complaints were asthenia, excessive sweating and digestive troubles. Splenomegaly was present in 27 and of these it was slight in 21. Moderate hepatomegaly was present in 7.

The Chorine reaction is a flocculation of the serum in distilled water—1·8 cc. of distilled water is mixed in a tube with 0·2 cc. of serum of patients. The density is read with a photometer. It is then left in an incubator at 37°C. for 3 hours, and the photometric readings are compared. The difference between them gives the titre of the reaction. This is not specific, as it is usually very high in leishmaniasis. Henry's reaction is well known and was employed in all patients examined in 1958, and proved to be the basis of malarial serodiagnosis. The flocculation reactions are gauged photometrically and the results are evaluated as follows:—0–15 is normal; 15–20 is the border zone; 20–25 is probably malaria; above that figure malaria is confirmed.

The results of the Chorine reaction were:—

less than 10—not malaria:	105
10–20—suspicious:	37
20–100—malaria:	0

The results of the reaction (in 88 cases) were:—normal, 70; suspicious, 7; probably malaria, 10; confirmed malaria, 1.

A correlation between these two reactions could only be substantiated in 4. Eventually it was decided that a positive Chorine reaction did not seem to produce results of statistical value. Henry's reaction, on the other hand, which was positive in those without clinical symptoms, was consistently negative in recent repatriates during their treatment and during the development of the malarial attack.

In 26 patients malarial attacks appeared for the first time after their repatriation, as follows:—

less than	1	month	in 5
„	2	months	in 1
„	3	„	2
„	4	„	4
„	5	„	4
„	6	„	4
„	9	„	2

No positive information in 4.

Philip Manson-Bahr

WILLIAMS, R. T. **The Metabolism of Antimalarial Drugs.** *West African J. Biol. Chem.* 1959, Dec., v. 3, No. 3, 59–62.

BRAY, R. S., BURGESS, R. W., FOX, R. M. & MILLER, M. J. **Effect of Pyrimethamine upon Sporogony and Pre-Erythrocytic Schizogony of** *Laverania falciparum*. *Bull. World Health Organization.* Geneva. 1959, v. 21, No. 2, 233–8. [16 refs.]

The investigations described here were carried out with the Liberian strain of *Laverania falciparum* (synonymous with *Plasmodium falciparum*), for the first time in the case of pre-erythrocytic schizogony. From earlier work by MILLER [this *Bulletin*, 1958, v. 55, 10] the authors were of the opinion that treatment with pyrimethamine monthly would afford protection from malaria provided drug-resistant strains did not arise. After doses of 25–50 mgm. of this drug it was found that gametocyte carriers were made non-infective to *Anopheles gambiae*. In chimpanzees the dosage and length of protection were determined for causal prophylactic activity.

In one experiment 50 or more mosquitoes were allowed to feed on each human gametocyte carrier, and when the carrier had been given 25 mgm. of the drug orally, further batches of mosquitoes were fed on the same person at definite intervals. The mosquitoes were dissected 4–17 days after the blood meal to determine the state of infection regarding microgamete and oökinete formation at the early stages and oöcyst and sporozoite formation later. It was found that mosquitoes were protected from 1 to 28 days after drug administration; oöcyst development was interrupted and they never penetrated the mosquito stomach wall; sporozoites were never present but microgametes and oökinetes were present for 48 hours. In another experiment mosquitoes were fed on an untreated gametocyte carrier, then on a non-infected patient treated with pyrimethamine. In this case, sporozoites were not prevented from appearing in the salivary glands. Also when mosquitoes were fed 3 days before an infective blood meal on patients receiving pyrimethamine, sporogony was not affected. When chimpanzees were inoculated intravenously with salivary glands of mosquitoes containing sporozoites of *Laverania falciparum* and liver biopsies made at intervals, it was evident that the drug had prevented the appearance of pre-erythrocytic schizonts.

The authors' query whether a community could be protected was answered in the affirmative, provided all gametocyte carriers in the area had been treated with the drug and drug resistance had not arisen. *J. D. Fulton*

RICOSSÉ, J., BAILLY-CHOUMARA, H., ADAM, J. P. & HAMON, J. Résultats d'une expérimentation de chimioprophylaxie par la pyriméthamine dans la zone pilote de lutte antipaludique de Bobo-Dioulasso. [**Trial of Pyrimethamine Prophylaxis in the Malaria Control Pilot Zone in Bobo-Dioulasso**] *Bull. Soc. Path. Exot.* 1959, July–Aug., v. 52, No. 4, 516–35, 4 graphs. [44 refs.]

A trial of chemoprophylaxis with pyrimethamine was carried out from June 1 to September 20, 1959, in 2 groups of villages near Bobo-Dioulasso, in French West Africa. Zone A, containing 15 villages with a population of 5,000, was treated with a combination of DDT spraying and pyrimethamine. The inhabitants of Zone B, which contained 3 villages with a population of 3,000, received pyrimethamine only. In both zones the drug was administered twice monthly as follows: children 0–5 years, 12·5 mgm.; 5–12 years, 25 mgm.; over 12 years, and adults, 50 mgm. The numbers actually receiving the dose at each distribution varied from 82 to 91%.

After 16 weeks of this régime, the results were disappointing, as shown by the results of monthly blood examinations set out below:

TABLE

Parasite and Gametocyte Indices in Children Aged 0–9 Years

Dates of blood examinations	ZONE A DDT plus Pyrimethamine		ZONE B Pyrimethamine only	
	PI	GI	PI	GI
Pre-control (March–May)	30·4	5·4	55·9	10·1
Post-Control				
Jun. 6–Jul. 12	3·0	1·8	5·4	4·9
Jul. 28–Aug. 8	1·2	0·4	1·6	0·3
Aug. 25–Sep. 6	0·9	0·0	1·5	0·0
Sep. 22–Oct. 4	1·0	0·0	15·8	2·3
Oct. 15–30	15·4	1·2	44·8	14·5

[NB: PI = parasite index; GI = gametocyte index.]

Parasite indices in both zones at first showed a precipitate fall, but after 3 months the figures for Zone B showed a substantial rise and a month later the parasite index in that zone had nearly reached its pre-control value, while the gametocyte index was actually higher. At the same period, in Zone A, where drug administration was reinforced with DDT spraying, the parasite index had risen to half its pre-control value and the gametocyte rate had also begun to rise.

It was concluded that failure to arrest transmission in either zone was due to the development of resistance to pyrimethamine on the part of the local strain of *P. falciparum*. This conclusion was confirmed experimentally by administering the drug in doses varying from 12·5 to 50 mgm. to two groups of children with parasitaemia. This failed to clear the blood of parasites. It was also shown experimentally that *P. falciparum* could complete its sporogonic cycle up to the sporozoite stage in specimens of *Anopheles gambiae* which had fed on children who had received pyrimethamine in therapeutic dosage.

G. Covell

MORIN, H. G. S. Comment entendre l'éradication du paludisme? [**Implications of Malaria Eradication**] *Bull. Soc. Path. Exot.* 1959, July–Aug., v. 52, No. 4, 485–97.

The author deplores the lack of interest hitherto shown in France in the policy of malaria eradication, in spite of the outstanding success which has attended many of the campaigns which have been undertaken with this object in view, notably in Corsica and Italy. To illustrate the practicability of achieving eradication under widely differing conditions, he reviews at length two recent publications by Professor LIVADAS and his colleagues, one relating to Greece, the other to the forest region of South Cameroons [this *Bulletin*, 1959, v. 56, 1217; 1960, v. 57, 218]. In Greece, a special antimalaria organization has been in operation since 1930; in the Cameroons the systematic country-wide campaign now in progress was initiated only in 1954. In both countries there is good reason to believe that a continuance of the technique at present employed will result in eradication.

Dr. Morin affirms that a campaign for the eradication of malaria is in the end less costly than measures of control, which must entail admission to hospital and medical treatment of the sick, carried on in sporadic fashion from year to year over an indefinite period. *G. Covell*

MARIANI, M., MARCECA, G., ODDO, F. & TERMINELLO, L. Ulteriori indagini sulla sensibilità al DDT dell'*Anopheles labranchiae* in Sicilia. [**Further Studies on the Sensitivity of *Anopheles labranchiae* to DDT in Sicily**] *Riv. di Parassit.* Rome. 1959, Sept., v. 20, No. 3, 191–8, 3 figs. [10 refs.] English summary.

The English summary appended to the paper is as follows:—

"Tests of sensitivity to DDT were carried out on 14,625 females of *A. labranchiae* in the field and in laboratory, using the toxicometric methods of Busvine and Nash, Fay and his colleagues and the W.H.O. The results obtained show once again that no modification of the original sensitivity of this species to DDT can be detected after 11 years of the application of this insecticide in the campaign against the adults.

"The experiments conducted contemporaneously in 1958 using the methods of Busvine and Nash and of the W.H.O. show that with *A. labranchiae*, the method of Busvine and Nash gives a slightly higher mortality than that given by the W.H.O. method at equal concentrations of DDT. In fact the LD_{50} with the Busvine and Nash method equalled 0·9 whilst that with the W.H.O. method equalled 1·3. It is probable that the different results with the two methods are to be attributed to the low level of irritability of *A. labranchiae* compared with other species; the lowered excitability allows those individuals which settle on the upper grill (untreated with insecticide) with which the W.H.O. tubes are provided, to escape the action of the insecticide.

"The behaviour of the *labranchiae* populations in Sicily with respect to their sensitivity to DDT, seems markedly homogeneous and is matched by their genetic homogeneity in respect of the arrangement of the left arm of the third chromosome.

"Seasonal variations in sensitivity were found in *A. labranchiae* also."

DAVIS, A. N., GAHAN, J. B., WEIDHAAS, D. E. & SMITH, C. N. **Exploratory Studies on Gamma Radiation for the Sterilization and Control of** *Anopheles quadrimaculatus*. *J. Econom. Entom.* 1959, Oct., v. 52, No. 5, 868–70.

Irradiation of pupae and adults of *Anopheles quadrimaculatus*, at dosages of 8,865 to 12,900 r, produced sterilization in both sexes. Irradiated females mated with normal males produced no eggs, and normal females mated with irradiated males produced only infertile eggs.

When irradiated males were introduced into cages containing normal males and females, a reduction in fertility was recorded, especially when the irradiated males outnumbered the normal males and females by 6:1:1 and 10:1:1. The authors suggest that these experiments show sufficient promise to justify further exploration of the possibility of using sterile males as a method of mosquito control.

[See also this *Bulletin*, 1959, v. 56, 597.] *B. R. Laurence*

MACGRATH, B. G., DEVAKUL, K. & LEITHEAD, C. S. **The Terminal Stages of** *Plasmodium knowlesi* **Infection in** *Macaca mulatta*. **I. The Clinical State: Resuscitation by L-Noradrenaline.** *Ann. Trop. Med. & Parasit.* 1959, Sept., v. 53, No. 3, 358–68, 2 figs. on pl. [25 refs.] **II. The Pharmacological Action of L-Noradrenaline and Adrenaline.** *Ibid.*, 369–79, 5 figs.

I. The experiments described here were made during an investigation of the pathological processes occurring in the terminal stages of infection of monkeys with *Plasmodium knowlesi*. The condition at this stage is described as one of medical shock. The effect of pressor drugs showed the physiological nature of the circulatory disturbances and that they were reversible. As death approached, the blood pressure fell, the animal appeared blue and the blood, which clotted slowly, became stagnant with practically no venous return to the heart, yet the pressor drugs elicited a pharmacological response. Finally, the limbs became flaccid and coma supervened, all the signs of circulatory failure being present, but, although the heart beat was feeble it remained regular. Circulation time, plasma and tissue-fluid volume and other data were obtained.

The effect of L-noradrenaline, adrenaline, methedrine (d-desoxyephedrine) and vasoxyl (methoxamine hydrochloride) on the condition was studied. Continuous intravenous administration of noradrenaline produced a dramatic result in 11 out of 12 monkeys, with recovery of consciousness in a few minutes and sometimes return to upright position from one of prostration accompanied by mental alertness. When blood transfusion plus chloroquine therapy followed these improvements the degree of recovery was varied and 2 animals became free from parasites. The value of combating shock in such conditions is obvious. Histological examinations of the tissues showed that anoxia was present. When a single dose of noradrenaline was given the condition of shock reappeared within an hour, yet this drug was superior to the others.

II. After the striking results obtained with noradrenaline in resuscitation of monkeys shocked at the terminal stages of malarial infection, the pharmacological action of the substances named above was studied, in normal and malaria-infected monkeys. The drugs were given intravenously in 5% glucose

under light Nembutal anaesthesia. Adrenaline and noradrenaline raised the blood pressure in normal and infected animals but gave rise to cardiac arrhythmia in the former which was abolished by atropine. Transfusion with blood from an infected animal gave similar results and suggested that it contained some active agent. The effect of methedrine and vasoxyl on blood pressure was less marked. Adrenergic blockade reduced the pressor effect of noradrenaline and reversed that of adrenaline.

[See also this *Bulletin*, 1952, v. 49, 354.] *J. D. Fulton*

GREENBERG, J. & KENDRICK, Louise P. **Resistance to Malaria in Hybrids between Swiss and Certain Other Strains of Mice.** *J. Parasitology*. 1959, June, v. 45, No. 3, 263–7, 1 fig.

Female Swiss mice were mated with males of the following strains (all of which were known to possess a lower degree of susceptibility to *Plasmodium berghei*): A/LN, DBA/2N, C_3H/Hen, C57B1/6JN and BALB/CANN. Also female STR mice (known to possess the lowest degree of susceptibility to *P. berghei*) were mated with C57B1/6JN males. The density of parasitaemia and the survival times of the progeny were then determined, in relation to these factors in Swiss mice. The density of parasitaemia was reduced in the crosses, particularly in Swiss × C57B1 and STR × C57B1 (the latter showing a mean infection rate on the sixth day of 9·7% compared with 45·9% in the control). The hybrid STR × C57B1 also survived longest (19 days compared with 7), and this survival rate was akin to the rate in the longer lived parent (STR); the hybrid Swiss × C57B1, on the other hand, showed a survival rate akin to the shorter lived parent (Swiss). The results indicate the complexity of genetic influences on survival.

[See also this *Bulletin*, 1959, v. 56, 421.] *P. C. C. Garnham*

SERGENT, Ed. & PONCET, Alice. Des variations expérimentales de la virulence de *Plasmodium berghei*. Exaltation—atténuation—mithridatisme. [**Experimental Variations in the Virulence of** *Plasmodium berghei*. **Exaltation—Attenuation—Mithridatism**] *Arch. Inst. Pasteur d'Algérie*. 1959, June, v. 37, No. 2, 227–55, 13 graphs. [Refs. in footnotes.]

This paper presents the results of 4 sets of experiments, based on a remarkable series of passages of *Plasmodium berghei* (strain Keyberg 173) continued over a period of 10 years in white mice.

(1) The virulence of *P. berghei* administered in a standardized dose was compared in three periods during (a) the first to the 39th passage in 1950, (b) the passages 513 to 546 in 1956 and (c) the passages 758 to 791 in 1959. All the mice died, but the course of the disease was reduced from 19 days to 9 days and the height of parasitaemia was raised from 30% to 100% during the decade.

(2) Over 3,000 mice were inoculated during the decade. In one series of adult mice, gradually decreasing numbers of parasites (from 14 million to 10) were inoculated; in numbers of 100 or fewer, infection was not constant, though it could be effected by only 10 parasites. The infection always proved fatal and the course was uninfluenced by the size of the

inoculum. In another series, the infection was exposed either *in vitro* or *in vivo* to nivaquine, and some diminution in virulence followed. 13% of mice, which had received 2·5 mgm. per 100 gm. body weight of nivaquine, presented a latent infection, lasting up to 9 months, leading either to a disappearance of the parasite, with a consequent loss of premunition and susceptibility to a challenging dose, or to a fatal relapse. There was thus no attenuation in virulence of the organism as a result of this treatment.

(3) A change of host from white mouse to white rat again produced no intrinsic modification in virulence. The course of the disease was similar in rats inoculated with a mouse-passaged strain and in rats inoculated with a rat-passaged strain.

(4) The authors were able to induce resistance to nivaquine in *P. berghei* infections in white mice. This acquired resistance is called "mithridatism". After inoculation with the parasite, the mouse received daily subcutaneous doses for 3 weeks of nivaquine (0·25 mgm. per 100 gm.); subinoculation was then performed into mice which were treated in the same way, and this was continued for 7 passages. During the first 4 passages the mice were cured and the infection was rendered latent; in the last 3 passages the parasite had become resistant to the drug and the mice died after violent attacks of malaria.

P. C. C. Garnham

TRAGER, W. **A New Virus of Ducks interfering with Development of Malaria Parasite** (*Plasmodium lophurae*). *Proc. Soc. Exper. Biol. & Med.* 1959, July, v. 101, No. 3, 578–82, 1 fig.

In the course of serial passages of *Plasmodium lophurae* through ducklings, the author detected the presence of a contaminant which inhibited the course of malarial infection and killed the birds. By successive passages of infected erythrocytes, which had been separated from the plasma and washed in each transfer, the malarial infection was restored to its normal state. That the contaminant was present in the plasma was demonstrated by infection of ducks with the plasma of birds harbouring both *P. lophurae* and the concomitant organism. The severity of the infection depended on the dose of the inoculum, varying from death within 3–5 days to recovery, with residual immunity. Infected duck plasma was still infective after storage in deep freeze for several weeks or in dry-ice box up to one year.

Since the infectivity of plasma was retained after filtration through Selas 03 porcelain filter, the causative agent is regarded as a filterable virus. The disease caused by it is characterized chiefly by enlargement and necrosis of the spleen, which can be neutralized by serum from a recovered immune duck. When ducklings were inoculated simultaneously with *P. lophurae* and the virus, development of the former was retarded and the parasites showed various abnormalities.

C. A. Hoare

TRYPANOSOMIASIS

*In this section abstracts are arranged as far as possible in the following order:—*African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:— epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

NIGERIA, NORTHERN. **Ministry of Health. Sleeping Sickness Service Annual Report 1958.** 30 mimeographed pp. 1959: Kaduna.

During the year an important administrative change took place when this service and the Medical Field Units were reunited and placed in the Endemic Diseases Division. The Field Units had originated from the Sleeping Sickness Service but had become a separate organization. Both will continue their field work as in the past. Staff shortage remains a problem but increased training facilities have been provided and may solve it.

The overall incidence of sleeping sickness (0·14%) remains at about the same level as in 1957 (0·15%) [this *Bulletin*, 1958, v. 55, 872]. No further reduction is believed possible by present methods because mass diagnostic techniques are too crude to detect the very early cases which are infective to fly but have no lymphadenitis. Mass diagnosis and survey can control but not eradicate the disease. Among the cases diagnosed 3,490 were proved new infections, 566 were clinical infections and 806 were relapses, probably in patients having failed to complete treatment. This high relapse rate (16·35%) might be remedied by the introduction of a short form of treatment.

Several localized epidemics are reported, some of which are the result of lack of cooperation with the service or failure to control the movements of people. Pentamidine prophylaxis is proving valuable in various circumstances, such as in the labour force on the new railway line to Maiduguri and in mine workers. In one area mass treatment had failed to reduce the incidence below 5% in a population of 20,000 but chemoprophylaxis begun in 1956 had reduced it to 0·06% in 3 years. It is concluded that sleeping sickness remains a menace and if a natural increase should occur it could spread rapidly.

Part II deals with tsetse control. Insecticidal spraying is much cheaper than vegetation control and is specially valuable for the protection of hamlets close to rivers where clearance would not be practicable. In Benue Province a single spraying with 4% dieldrin emulsion applied after the failure of DDT wettable powder produced excellent immediate results and the cost was £41 per mile (at 10 gallons of 20% concentrate per mile) as compared with an estimated £200 per mile for clearing. Tests of tree poisons have been concluded and the results are so unpredictable that they cannot be used in control. Appendices detail the sources and incidences of sleeping sickness cases.

T. H. Davey

SCOTT, D. **Human Trypanosomiasis in Northern Ghana, 1950–56. An Epidemiological Review.** *West African Med. J.* 1959, Oct., v. 8 (n.s.), No. 5, 165–84, 4 maps. [14 refs.]

The author gives the history of sleeping sickness in Northern Ghana so far as it is known. The first confirmed case was in 1906 but control was not started until 1933 when two foci were found which were projections of a large epidemic in adjacent French territory. In 1937 a mass diagnosis and treatment

campaign disclosed an incidence of 5·74% in 8,646 people examined. This outbreak was rapidly controlled, and in 1949 the incidence was only 0·2% in some 216,000 people examined. The present incidence is low overall and in individual districts as a result of control measures and of natural waning of the causes of the epidemic.

As regards epidemiology, the incidence in males is almost always higher than in females, and greater in adults than in children and adolescents. The disease appears usually to be contracted in the bush and on farms remote from the villages. Where transmission occurs near the villages the incidence is higher and all sections of the population are equally affected. Where incidence is highest in women, transmission is occurring at the water points. Examination of the distribution of cases showed that infection was correlated with proximity to major rivers, enhanced by proximity to important roads. This pattern of distribution differs from that in Ashanti, previously described by the author [this *Bulletin*, 1958, v. 55, 376], where fly is ubiquitous. There are in Northern Ghana 5, possibly 6, small localities where the infection rate is considerably higher than in other parts, probably because of the existence of a permanent fly habitat close to human communities. The author entertains the possibility of a non-domestic animal reservoir of infection which would maintain the continued low incidence of the disease in remote areas. *T. H. Davey*

ASHCROFT, M. T. **The Importance of African Wild Animals as Reservoirs of Trypanosomiasis.** *East African Med. J.* 1959, June, v. 36, No. 6, 289–97. [15 refs.]

This paper gives a useful summary of information relating to African trypanosomiasis in man and animals, and the insect vector. The incidence of trypanosomiasis in wild animals is tabulated and is shown to be remarkably constant from place to place. Then the animals are classified according to their attraction to *Glossina morsitans* and *G. swynnertoni* as shown by precipitin tests of blood meals of the flies and by observations on actual biting. Finally, the susceptibility of wild animals to the polymorphic trypanosomes is considered. From an analysis and these factors, the author concludes [in contrast to the Indices in the Table] that animals such as the kudu, giraffe and reedbuck (though less bitten) may be more important as reservoirs than the warthog (the most preferred host of the fly). [The discovery by HEISCH *et al.* (see this *Bulletin*, 1959, v. 56, 698) of the actual reservoir of *Trypanosoma rhodesiense*—the bushbuck—was made after this paper was submitted for publication.] *P. C. C. Garnham*

DUGGAN, A. J. **An Approach to Clinical Problems of Gambian Sleeping Sickness.** *J. Trop. Med. & Hyg.* 1959, Nov., v. 62, No. 11, 268–74, 3 figs. [21 refs.]

The classical concept of African sleeping sickness is that of a disease which passes through 3 well-defined stages, the last being fatal. This picture does not register with the clinical picture of many cases, or with the epidemiology of the disease, as seen in many areas of trypanosomiasis endemicity. In some areas where the mortality from it is high, intermediate stage cases are far more numerous than the sum of both early and late stage cases. This indicates that the deaths from the disease must occur before it progresses to its generally accepted terminal stage.

Investigation and prolonged observation of individual patients have led the author to the conclusion that the cause of African sleeping sickness in a given case is unpredictable; it is governed by the changing host-parasite relationship in that particular patient. An early and very significant physiological change appearing in the disease is an increase in the gamma globulin fraction of the protein in the serum; this is attended by increased agglutinability of the red cells and a marked increase in the red cell sedimentation rate (ESR). After invasion of the central nervous system (CNS), indicated by an increase in the protein and cells in the cerebrospinal fluid, the ESR slowly but progressively falls. The host-parasite relationship approaches to a state of symbiosis during the latest stage of sleeping sickness, at the cost to the patient of sanctuary for the parasites in his CNS. It is during the stage of peripheral invasion, before the CSF changes have become gross, that the host is at the greatest disadvantage in relation to his infection. The ESR affords a reliable guide to the state of balance between host and parasite.

The natural history of the disease starts with the local invasion and multiplication of the parasites. It progresses to peripheral invasion, rapidly followed by a high ESR and by this time usually early CSF changes. These proceed to late CSF changes with a fall in the ESR; finally the disease becomes "burnt out", with a normal CSF and ESR but residual clinical evidence of CNS disorder. Death from the disease commonly occurs during the stage of peripheral invasion and is due to an overwhelming infection; when death occurs during the late stage, with gross CSF changes, it is caused by inanition or secondary infection rather than by the trypanosomal infection.

Variations in the progress of the disease are evident in different patients. In some patients in whom peripheral invasion has occurred, and even in some in whom there are early CSF changes, spontaneous cure may take place. But as a rule the host's defences lag behind the attack of the parasite and do not equal it, and so establish an equilibrium, until the CNS is extensively involved. The defensive mechanism is at its best when the ESR is highest. When chronic, slowly progressive, neurological disturbances are evident the older chemotherapy is unlikely to be of any benefit. Treatment with melarsen compounds may be dramatic; the drug may result in a rise in the ESR with an increase in the CSF changes for a time; possibly the imbalance between host and parasite indicated by these changes is a necessary prelude to clinical improvement in late stage sleeping sickness. *A. R. D. Adams*

ROBERTSON, D. H. H.; JENKINS, A. R. **Hepatic Dysfunction in Human Trypanosomiasis. I. Abnormalities of Excretory Function, Seroflocculation Phenomena and other Tests of Hepatic Function with Observations on the Alterations of these Tests during Treatment and Convalescence** [ROBERTSON & JENKINS]. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, Nov., v. 53, No. 6, 511–23, 1 fig. [31 refs.] **II. Serum Proteins in *Trypanosoma rhodesiense* Infections and Observations on the Alterations found after Treatment and during Convalescence** [JENKINS & ROBERTSON]. *Ibid.*, 524–33. [22 refs.]

I. The authors have seen 132 new cases of *T. rhodesiense* trypanosomiasis from S. E. Uganda and 3 of trypanosomiasis due to *T. gambiense*, one from Pagaya, and 2 from Central Nyanza. The present two papers deal with an

investigation of liver function and serum proteins in groups of these patients in different stages and states of the disease. None of the subjects had treatment before admission and the initial tests were carried out at once so that specific treatment could be begun within 24 hours of admission to hospital. According to findings in the cerebrospinal fluid (CSF) the patients were classified as "early", "intermediate", and "late". 90 of the cases of *T. rhodesiense* trypanosomiasis were considered early because trypanosomes were absent, protein was less than 25 mgm.%, and leucocytes 10 or less per cmm. 16 were considered intermediate, because the protein level was 25–29 mgm. per 100 ml. CSF, or because, though the protein content was normal, there were more than 10 leucocytes per cmm. CSF or trypanosomes were present, or both abnormalities were noted. Late cases were identified as showing a protein content above 29 mgm. per 100 ml. CSF, 6 with a level of 30–35 mgm., and 20 with more than 35 mgm. of protein per 100 ml.

The urine was examined for bilirubin, urobilinogen and urobilin, the serum for bilirubin, zinc sulphate turbidity, thymol turbidity and thymol flocculation; the bromsulphthalein tolerance and the hippuric acid synthesis tests were also performed. Jaundice of the ocular sclera was seen in only 5 (4%) of the 132 patients, all male, with acute fever and toxaemia, 4 of them early, and 1 intermediate. Of 69 early cases 26 (38%) presented with hepatic tenderness, and of 18 intermediate and 20 late cases, 5 and 6 respectively had tenderness. About one-quarter of all patients in each group also showed liver enlargement. Excess urinary urobilin(ogen) was the most frequent abnormality and occurred in 83% of early patients, in 67% of the intermediate and in 40% of the late patients. In general the excess pigment disappeared from the urine during the first week of treatment, but in some severe cases it persisted for up to 3 weeks. 29 of 36 early patients, 6 of 9 intermediate, and 6 of 11 late patients had bilirubin in their urine. Bilirubinuria generally disappeared within one week of beginning of treatment. Of 19 consecutive early cases 18 had raised serum bilirubin values (above 1 mgm.%), 11 of these became normal immediately after treatment and on follow-up all were within normal limits. Afebrile or clinically mild cases tended to show little or no abnormality in the bromsulphthalein tolerance test. There was an association between high serum bilirubin and retention of bromsulphthalein, but the degree of retention was not strictly related to the serum bilirubin level. The bromsulphthalein tolerance reverted to normal after treatment in all patients within a short time.

The results of serum flocculation tests were less uniform. In the early cases zinc sulphate turbidity was abnormal in only 7 of 46 (15%). All 46 were normal on follow-up. Thymol turbidity was abnormal in 16 (35%). On follow-up 43 (93%) were normal, and the remaining 3 (7%) were nearly normal. The thymol flocculation was abnormal in 19 (41%), and the number of abnormal cases had risen to 28 (61%) at the end of the treatment. However, on follow-up 20–60 days after discharge, 23 of the 29 patients whose test had been abnormal initially or had become abnormal after treatment, presented themselves for examination, and of these only 4 were still abnormal.

All of 11 late cases showed abnormal flocculation tests, notably an abnormal thymol flocculation. The zinc sulphate turbidity test reverted completely to normal after an average period of 49 days after discharge, but thymol turbidity was still abnormal in 4 patients after periods of 54, 42, 42, and 27 days respectively. In one early *T. rhodesiense* and one late *T. gambiense* case

the hippuric acid synthesis was diminished but reverted to normal within 2 weeks of beginning of treatment.

II. In 26 early patients the mean serum albumin was 2·98 gm.%, and this value had risen on follow-up to 3·89. Not all showed an increased proportion of gamma globulin, but the mean value was 2·96 gm.%. This value rose while the patients were being treated and on discharge it was 3·03. It fell gradually and on follow-up the mean gamma globulin amounted to 2·89 gm.%.

The authors point out that the high gamma globulin cannot all be accounted for by the formation of antibody, and that some of it must be due to the general stimulation of the reticulo-endothelial system. Also macrophages are known to shed their protein envelope when incorporating parasites. 10 late patients showed a lower serum albumin and a very much higher gamma globulin than the early patients.

On admission *Albumin and gamma globulin in T. rhodesiense infection*

mean values in gm.%

	Albumin	Gamma Globulin
26 early cases	2·98 ± 0·72	2·96 ± 0·64
10 late cases	2·19 ± 0·57	5·27 ± 2·13

In the late patients the serum albumin increased significantly on discharge after treatment, and a further increase occurred during the follow-up period after discharge at the end of which the mean value had risen to 3·54 gm.%. The serum gamma globulin fell, but less rapidly than the serum albumin rose.

The authors conclude that in *T. rhodesiense* infection in man a parenchymatous disorder of the liver occurs which is of greatly varying severity and which is reversible by specific treatment. The occasionally noted intolerance to large doses of mel B [APTED, this *Bulletin*, 1954, v. 51, 152; 1957, v. 54, 541] may well be due to hepatic dysfunction in severely ill patients. *H. Lehmann*

PÉLISSIER, P. Les inconnues dans la trypanosomiase humaine Africaine et le problème de la chimiorésistance "a propos d'une observation de chimiorésistance prolongée". **[Unknown Factors in African Trypanosomiasis and the Problem of Drug Resistance. Report of a Case of Prolonged Drug Resistance].** [Thesis.] 97 mimeographed pp. 1 chart & 2 maps. [Numerous refs.] 1958, Nov. Montpellier: Université de Montpellier, Laboratoire de Parasitologie, Faculté de Médecine.

The first part of this thesis consists of a description of a "healthy carrier" of trypanosomiasis, a young girl (aged 4 years when first diagnosed in 1938) from Togo, French West Africa (now Togoland Republic). In spite of repeated courses of treatment with Atoxyl, Orsanine, tryparsamide, Moranyl (suramin), pentamidine and two antimonials (aniline emetic [a compound of antimony oxide and acid tartrate of aniline] and anthiomaline), including "synergistic" treatment with Moranyl and another drug, the infection apparently persisted for 11 years and was still present at the completion of the author's observations. When first examined by the author, 9 years after the original diagnosis, the patient showed few signs—only a generalized enlargement of the lymph nodes, lymphocytosis and eosinophilia, splenomegaly (probably due to malaria), hepatomegaly, some pulmonary congestion and myocarditis. 27 lumbar punctures made throughout the course of the disease had failed to show any

signs of involvement of the cerebrospinal fluid (CSF). A detailed history of the treatments administered and the course of the infection is given.

In the second part the author discusses possible reasons for the unusual course of this infection. Reinfection was very unlikely because for much of the time the patient was in hospital and, further, her home was in an area where the incidence of new cases was low. Many of the drugs given (Orsanine, Moranyl, pentamidine) were given initially in subtherapeutic doses, but the author dismisses this as a cause of the drug resistance of the strain because (a) insufficient time elapsed for the development of resistance after the treatments were begun, (b) all the drugs were given finally in doses as large as, or larger than, normal, and (c) the unusual avirulence of the strain suggests that it was an abnormal strain and so its resistance to therapy may have been a natural characteristic. [It seems possible to the reviewer that errors in some of the courses of treatment may have contributed to at least some of the strain's resistance: for example, the first two courses of treatment were of Orsanine, given over a period of 10 months and each consisting of only about three-fifths of the normal dose, according to the author. There was then a lapse of about 5 months before treatment was recommenced with Atoxyl, another arsenical drug.]

The author propounds the view that the chronic drug-resistant strain described above is in fact an "animal" strain which is in the process of adapting itself to man, typical *Trypanosoma gambiense* being the last stage in such an evolution from *T. brucei*. In support of this he describes briefly a second case of apparently spontaneous drug resistance in a patient from the same district as the one described above, in whom infection persisted for 12 years (and perhaps longer), again with no marked symptoms and without involvement of the CSF. He also describes two areas, in which wild animals were plentiful, where the incidence of arsenic-resistant strains was higher than usual. The author believes that invasion of the CSF occurs only when the host's antibody titre is reduced, and so argues that failure to invade this fluid would be expected of an incompletely adapted strain of trypanosomes as such a strain would be highly antigenic to its new host.

Two attempts to isolate the strain described in Part I of this thesis failed, but its morphology in the patient was described by Dr. L. Lapeyssonnie as stumpy, intensely stained by Giemsa's stain and lacking a free flagellum. On the basis of this description and its wide drug resistance, which he believes to be a natural attribute, the author thinks that the strain in question is probably related to *T. congolense* and is, as mentioned above, in the process of adaptation to life in man. [It seems necessary to point out that the description of the parasite given by Lapeyssonnie could equally well apply to the stumpy forms of a strain of the *T. brucei* group and that if, as seems possible, some at least of the strain's drug resistance was due to initial under-treatment, this drug resistance cannot be regarded as indicating possible relationships of the strain.] *J. R. Baker*

Trager, W. **Development of *Trypanosoma vivax* to the Infective Stage in Tsetse Fly Tissue Culture.** *Nature*. 1959, Sept. 5, v. 184, B.A. 30–B.A. 31.

The chief disadvantage of most methods used for the cultivation of tsetse-borne pathogenic trypanosomes is their inability to promote the development

of the infective metacyclic forms. To overcome this difficulty the author (while working in West Africa) developed a new method for growing trypanosomes in tsetse-fly-tissue culture. For this purpose, the alimentary canal and salivary glands of pupae or young adult *Glossina palpalis*, which had been reared under sterile conditions, were dissected aseptically, and fragments were explanted in hanging drops or in a thin layer of the culture medium, which is made up as follows:

(1) Solution *A* containing (mgm./100 ml.) NaCl 90, KCl 300, $NaH_2PO_4.H_2O$ 110, $MgSO_4.7H_2O$ 370, $CaCl_2$ 80, glucose 150, trehalose 50, 1-malic acid 50, α ketoglutaric acid 25, succinic acid 5, lactalbumin hydrolysate 1,000, Difco yeast extract 200: these ingredients are dissolved in redistilled water, *p*H adjusted to 6·8, and the solution is sterilized through Selas 03 porcelain filter.

(2) Solution *B* containing (mgm./10 ml.) reduced glutathione 200, ascorbic acid 2.

(3) Final mixture: 8 ml. of *A*, 2 ml. sheep serum and 0·5 ml. of *B* are mixed together.

(4) 2 sterilized pupae are crushed in 1 ml. of above mixture in a centrifuge tube, its contents are centrifuged at 2,000 r.p.m. for 15 minutes, and the supernatant constitutes the culture medium. A hanging drop of such culture is inoculated with a small drop of infected blood or trypanosome concentrate. Continuous development *in vitro* was achieved with *Trypanosoma brucei*, *T. congolense* and *T. vivax*.

The results obtained with *T. vivax* are described in detail. When isolated from sheep with a chronic infection, this species could be grown in 2-day-old tsetse-tissue culture at 30–32°C. and subsequently maintained indefinitely in blood agar medium. Although metacyclic forms appeared in this tissue culture, they failed to infect sheep. However, when grown at 38°C. they produced very scanty infections in 2 sheep, lasting up to 18 days, with occasional fever.

It is suggested that inoculation of attenuated cultural trypanosomes might provide a basis for practical immunization against trypanosomiasis.

C. A. Hoare

PAUTRIZEL, R., LAFAYE, A. & DURET, J. Anticorps et modifications plasmatiques au cours de la trypanosomose expérimentale du lapin par *Trypanosoma equiperdum*. [**Antibody and Plasma Changes during Experimental Infections of Rabbits with** *Trypanosoma equiperdum*] *Rev. d'Immunologie*. 1959, July–Sept., v. 23, No. 4, 323–35, 4 figs. [13 refs.]

15 rabbits were infected with *Trypanosoma equiperdum* and the course of the untreated infection was studied. After the second week there was loss of vitality and some somnolence; the animals became thin and the temperature was raised. After 3 weeks there was inflammation of the conjunctiva and nose, and most rabbits died after 4–5 weeks. A second batch of 13 rabbits was similarly studied; after 3 weeks they were given 0·1 ml. of Arsobal (presumably 3·6% solution) on 3 successive days, preceded and followed by the intramuscular injection of 1 ml. Phenergan (promethazine) which is indispensable to prevent shock. The serum proteins were investigated by paper electrophoresis. The albumin/globulin ratio was initially greater than 1, but it began to fall in the first week of parasitaemia, until just before death in the untreated rabbits it reached 0·27; by contrast in the rabbits treated with Arsobal the

ratio rose, reaching a peak of 1·7 after 5 weeks. In the untreated rabbits the albumin fell from 71 to 25% before death; the alpha and beta globulins rose slightly, and the gamma globulin rose from 8% to 33%. By contrast in the rabbits treated with Arsobal these changes were partially reversed after treatment but the gamma globulin remained higher than normal. 6 weeks after treatment the gamma globulin rose again and the alpha globulin fell almost to zero. [Perhaps this was due to a recurrence of the trypanosomiasis, since apparently few of the treated rabbits were permanently sterilized.]

In the complement-fixation tests with trypanosome antigen, antibodies appeared in the sera of some rabbits on the third day after infection and they increased rapidly during the first 2 weeks. After 3–4 weeks the antibody titre rose to a peak of 1 in 24. After treatment with Arsobal it declined gradually to a titre of 1 in 8, 15 weeks after infection. This titre persisted for 7 months after treatment. These sera containing trypanosome antibody gave a negative Wassermann reaction, showing that the antibody is specific for trypanosomes. The antibodies which fix complement appear much earlier than does the rise of gamma globulin and the curves for the two substances are not parallel. Accordingly, the rise in gamma globulin cannot be ascribed merely to the production of antibodies against trypanosomes.

The authors consider that the general upset of the normal relations between the different serum proteins may be due to disturbance of the reticulo-endothelial system (and possibly of the liver). Possibly the rise of gamma globulin is a compensation for the fall of albumin. *F. Hawking*

De Lucena, D. T. A doença de Chagas em Pernambuco, Brasil. **[Chagas's Disease in Pernambuco, Brazil]** *Rev. Brasileira Malariologia.* Rio de Janeiro. 1958, Oct., v. 10, No. 4, 405–15. [14 refs.] English summary.

This study, which is part of a complete survey of Chagas's disease in Pernambuco, deals with the indices of infection of triatomids, a serological survey and a study of clinical cases in institutions in Recife. The State of Pernambuco consists of 3 geographical zones: the largest, the "bush," is hot and dry and the others, the rural and coastal areas, humid and have much more rain, which is considerable on the very humid coast. The area of the State is 97,016 square kilometres and it is divided into 90 counties. Details of infected triatomids found may be summarized as follows:

	Surveyed	% with Triatomids	% with infected Triatomids
Counties	84	91·67	70·24
Localities	1,574	44·75	17·92
Houses	18,238	9·46	2·42

Altogether 15,666 triatomids were collected and 13·14% were found to be infected with *Trypanosoma cruzi*. The epidemiological indices differed in the 3 zones and were highest in the "bush" area (*Sertão*), and these data corresponded with clinical incidence. The percentage of infections of the 7 species of Triatomids were:

P. megistus	14·41
T. brasiliensis	10·61
T. maculata	7·80
T. rubrofasciata	4·80
P. lutzi	20·0 (1 out of 5)
T. sordida	0
T. melanocephala	0

Complement-fixation tests on sera from 3,267 persons in 11 areas were positive in 14·88%.

Only 3 cases of the acute form of the disease have been described in Pernambuco since 1953, but 158 chronic cases have been reported. The author describes 100 confirmed cases from the medical institutions in Recife of which 72 were of the cardiac form, 13 were "megas" (oesophagus, colon or both) and 15 undetermined. All 100 patients are listed in a table which shows their places of origin, clinical diagnosis, X-ray and electrocardiographic findings and results of complement-fixation tests. *H. J. O'D. Burke-Gaffney*

NORMAN, Lois, BROOKE, M. M., ALLAIN, D. S. & GORMAN, G. W. **Morphology and Virulence of *Trypanosoma cruzi*-Like Hemoflagellates isolated from Wild Mammals in Georgia and Florida.** *J. Parasitology.* 1959, Aug., v. 45, No. 4, 457–63. [23 refs.]

The authors made a study of 7 strains of trypanosomes isolated in Georgia and Florida from opossums (5), a raccoon and a skunk. They were compared morphologically with each other and with 3 known species (*Trypanosoma cruzi*, *T. rangeli* and *T. duttoni*). Their virulence was studied in experimentally infected mice and their development was followed in *Triatoma infestans*.

All the 7 strains proved to be morphologically identical in cultures, in the bugs and in mouse tissues, and were indistinguishable from *T. cruzi*. However, the infectivity and virulence of these strains showed differences, according to which they could be divided into the following 3 groups on the basis of parasitaemia in and mortality of weanling mice: (1) moderately virulent, represented by "Corpus Christi" strain of *T. cruzi*; (2) slightly virulent, represented by "Brasil" strain of *T. cruzi* and 3 opossum strains; (3) of low virulence, represented by strains from skunk, raccoon and one of the opossums. All the strains are regarded as belonging to *T. cruzi* but differing in virulence. *C. A. Hoare*

DIAS, E. & SEREBRENICK, S. Aspectos climáticos da distribuição dos transmissores da doença de Chagas no Vale do Rio São Francisco. [**Climatic Aspects of the Distribution of Vectors of Chagas's Disease in the Rio Sao Francisco Valley, Brazil**] *Mem. Inst. Oswaldo Cruz.* 1958, Dec., v. 56, No. 2, 407–14, 6 maps.

The distribution of *Panstrongylus megistus*, *Triatoma sordida*, *T. infestans*, *T. brasiliensis* and *T. maculata* along the drainage system of the Rio São Francisco in 208 municipalities, mainly in Minas Gerais and Bahia Province, Brazil, and the presence of trypanosome infection in the 5 species, are shown in detail in a table and 6 maps. Infected bugs are found mainly in the south of the area surveyed, Minas Gerais, although there are small areas of infection in parts of Bahia and Alagoas Provinces further north. *T. brasiliensis* and

T. maculata are found mainly in the north of the survey area; *T. sordida* is distributed almost uniformly along the river valley; and *T. infestans* and *P. megistus* are both recorded mainly from the south.

The authors correlate this distribution with a preference of the southern species for higher humidities, 73–80% RH, and minimum annual mean temperatures below 24°C., and the northern species for semi-arid tropical climates with lower humidity, 50–73% RH, and higher annual mean temperatures of from 25° to 27°C.

All 5 species have been found infected in nature but higher percentages of infection were found in *P. megistus* and *T. infestans*. *B. R. Laurence*

JATENE, A. D. & JACOMO, R. Doença de Chagas e transfusão de sangue. [**Chagas's Disease and Blood Transfusion**] *Rev. Goiana Med.* 1959, Jan.–Mar., v. 5, No. 1, 23–30. [20 refs.] English summary.

The danger of transmission of Chagas's disease in the course of blood transfusion was suggested by DIAS in 1945, since when a number of observers in Brazil, with the use of the Machado-Guerreiro reaction (MGR), have demonstrated the occurrence of this disease in blood donors and its transmission to recipients [this *Bulletin*, 1954, v. 51, 893, 894; 1955, v. 52, 22; 1956, v. 53, 163]. In the course of 2 years (1955–7) the authors carried out an investigation of this problem at the Central Blood Bank of Uberaba and in local hospitals. They found that among 640 unselected blood donors, 96 (15%) reacted positively to MGR. Of these, 331 were examined more closely, and it was shown that in one group, comprising 219 persons of a higher social standing, 16 (7·3%) reacted positively, while in another, comprising 112 persons from rural areas, the reaction was positive in 28 (25%).

In considering methods of control, the authors point out that the examination by MGR of all samples of blood, and the use for transfusion of negative samples only, is impracticable, because (1) on repeated tests some of the latter blood samples reacted positively, and (2) in cases of recent infection MGR is negative. It is therefore recommended that all blood used for transfusion in endemic areas of Chagas's disease should be sterilized *in vitro* with gentian violet [*ibid.*, 1955, v. 52, 22].

The procedure, which is employed with success in blood banks of Araguarí and Uberlândia, is as follows: 2·5 gm. gentian violet are dissolved in 500 cc. of glucose-serum (5%) giving a solution of the dye of 0·5%; 25 cc. of the solution (containing 125 mgm. of the dye) are placed in flasks and autoclaved; the contents of a flask are added to freshly drawn blood, in a concentration of 1:4000, and the blood is placed in a refrigerator for 24 hours, after which it can be safely used for transfusion. *C. A. Hoare*

TORREALBA, J. F., PIERETTI, R. V., RAMOS, Italia, DÍAZ VÁZQUEZ, A. & PIERETTI, O. H. Encuesta sobre enfermedad de Chagas en la Penitenciaría General de Venezuela. Examen de 62 reclusos. [**Study of Chagas's Disease in the General Penitentiary of Venezuela**] *Gac. Méd. de Caracas.* 1958, July–Dec., v. 67, Nos. 7/12, 19–58, 3 graphs & 7 figs. [13 refs.] German summary.

The authors made a study of Chagas's disease in 62 young inmates of a penitentiary in Venezuela, most of whom came from the state of Guárico.

They discuss the incidence of the disease in Venezuela and also of its cardiac complications. It is estimated that about a million people are infected and that at least 300,000 of them have electrocardiographic changes. Reference is made to previous studies by the authors and others.

In the present investigation, in addition to various routine examinations, the diagnostic methods used were xenodiagnosis, complement fixation and the Sabin-Feldman dye test for toxoplasmosis, adapted for use in Chagas's disease with cultures of *Trypanosoma cruzi* as antigen. The technique is described. The results are discussed and compared with the findings of others.

35 patients were considered to be positive for Chagas's disease by one or more tests; the dye test alone was positive in 13 cases, in combination with complement fixation in 4 cases and with xenodiagnosis in 4 cases. All 3 tests were positive in 14. Details are given of the 35 patients. The dye test was the most sensitive of the 3, but the authors point to the need for further rigorously controlled trials of the dye test to exclude all suspicion of false positives. They have carried out the dye test and complement fixation on 20 European immigrants to Venezuela and found them negative except for one, probably non-specific, complement-fixation test.

X-rays showed cardiomegaly in 11 patients, 9 of whom were among the 35 who were positive for Chagas's disease. There were 7 patients with abnormal electrocardiographic findings; 2 showed the characteristic features seen in established manifestations of Chagas's disease and the others suggested earlier lesions. None of these patients had shown clinical signs of cardiac insufficiency. Electrocardiographic tracings and short clinical notes are presented for each of the 7 patients. *H. J. O'D. Burke-Gaffney*

FIFE, E. H., Jr. & MUSCHEL, L. H. **Fluorescent-Antibody Technic for Serodiagnosis of *Trypanosoma cruzi* Infection.** *Proc. Soc. Exper. Biol. & Med.* 1959, July, v. 101, No. 3, 540–43.

An account is given of the technique of immuno-specific staining with fluorescein-conjugated globulin (fluorescein-labelled antibody) for the serological diagnosis of Chagas's disease. In order to assess its value, comparative tests were carried out with homologous sera (from cases of Chagas's disease) and heterologous sera (syphilitic and normal). A suspension of cultures of *Trypanosoma cruzi* containing 10^7 organisms, washed in phosphate-buffered salt solution (PBS) and formalinized, served as standardized antigen. For each test, 1 ml. of the suspension was transferred to a 13 × 100 mm. test-tube and centrifuged, the supernatant fluid was decanted, and 0·1 ml. of test serum was added to the trypanosomes, mixed, and incubated for 18 hours at 3°C. The organisms were then washed, sedimented and treated with 0·1 ml. of fluorescein-labelled anti-human antibody (the preparation of which is described in detail), after which they were incubated for 30 minutes at 3°C., washed again and suspended in 0·1 ml. of PBS. Finally, a drop of test mixture was mixed with equal volume of 90% buffered glycerin on a slide, mounted under a coverslip, and examined under fluorescent microscope. The degree of fluorescence served as a measure of the sensitivity and specificity of the test, the results of which were compared with parallel complement-fixation tests (CFT).

It was shown that all the 40 trypanosomiasis sera reacted positively in this

test, but only 37 in the CFT. On the other hand, 2 of 20 syphilitic and 3 of 70 normal sera gave weak reactions in the fluorescent-antibody tests, but the CFT reactions were all negative. It is concluded that the former method, alone or combined with CFT, "can play an important role in serodiagnosis of *T. cruzi* infection". *C. A. Hoare*

De Brito, T. & Vasconcelos, E. **Necrotizing Arteritis in Megaesophagus. Histopathology of Ninety-One Biopsies taken from the Cardia.** *Rev. Inst. Med. Trop. São Paulo.* 1959, Sept.–Oct., v. 1, No. 3, 195–206, 9 figs. [45 refs.]

In a study of 91 biopsies of the cardia of the stomach in patients with megaoesophagus, the histopathology has shown destruction of the plexuses, sometimes with the formation of neuromata, and subacute and chronic interstitial myositis with the formation of zones, distinguished by Koeberle [this *Bulletin*, 1957, v. 54, 147] as *Entzündungstrasse*, which sometimes extend as far down as the affected plexuses. Focal myositis with formation of granulomata is also common. There is also a necrotizing arteritis, with partial or total medial destruction of the arterioles in the vicinity of the plexus or located beneath the serosa. The inflammatory process around the vessels is composed mostly of histiocytes, lymphocytes and scanty eosinophils.

The authors consider that this serious condition is mainly allergic in origin. The process seems to be progressive in that different portions of the oesophagus and stomach are affected at different times. The older lesions were located in the cardia itself. In one case leishmanial forms were found inside a smooth muscle fibre. The findings suggest that megaoesophagus and megacolon constitute one manifestation of a more general process affecting the gastrointestinal tract as a whole. In addition to this, epidemiological and pathological data seem to single out Chagas's disease as one of the factors in megaoesophagus in Brazil. There is a certain similarity between chronic Chagas's myocarditis and the myositis seen in megaoesophagus. In chronic myocarditis the allergic factor is fundamental and it has also some relationship to megaoesophagus in the shape of necrotizing arteritis.

[This paper is illustrated with excellent photomicrographs showing all the lesions referred to.] *Philip Manson-Bahr*

Cardoso, A. A. A retossigmoidectomia no tratamento do megacólon chagásico. **[Rectosigmoidectomy in the Treatment of Megacolon in Chagas's Disease]** *Rev. Goiana Med.* 1959, Apr.–June, v. 5, No. 2, 103–27, 19 figs. [17 refs.] English summary.

The author, from Ribeirão Prêto, Brazil, discusses briefly the aetiology of megacolon in relation to Chagas's disease [see, for example, this *Bulletin*, 1957, v. 54, 935] and then discusses 52 cases seen between 1952 and 1958, with special reference to surgical treatment.

The patients came from poor surroundings, where triatomid bugs were common. They were aged 19 to 68 years, with an average of 35 to 45 years.

Symptoms had been present in many patients for long periods and had become progressively worse, in some cases leading to surgical emergency. All patients were positive to the Machado Guerreiro complement-fixation test: there were 20% who showed no cardiac changes.

7 patients refused operation: in the remainder rectosigmoidectomy by the abdominal approach was undertaken. 5 of these patients died and there were 7 other deaths after emergency exploratory laparotomies or from other causes. The remaining patients did well.

The pre-operative and operative techniques are described at length and illustrated with photographs. There are also 4 X-ray photographs and 2 photomicrographs showing histological changes; these changes are discussed in respect of 3 cases. The need is stressed for skill, a good knowledge of the regional blood supply and careful pre- and post-operative treatment.

H. J. O'D. Burke-Gaffney

PRATA, A. Prognóstigo e complicações da doença de Chagas. [**Prognosis and Complications in Chagas's Disease**] *Rev. Goiana Med.* 1959, Apr.–June, v. 5, No. 2, 87–96. English summary.

Observations were made on 500 patients with Chagas's disease, on a number of whom necropsies were performed. Acute cases numbered less than 10. Here the prognosis can be regarded as being reasonably good, unless the patient is young or meningo-encephalitis develops. In the asymptomatic or latent stage the diagnosis can often be made by the Machado-Guerreiro (M-G) complement-fixation test and a number of patients seem to remain in this stage almost indefinitely without myocarditis, even though the M-G reaction is positive.

Figures are quoted from the examination of 328 men aged between 16 and 25 years, who were examined before joining the Brazilian Navy. The M-G test was carried out on all and ECG tracings also. 270 men were found to be M-G negative; in 3 of these there were some alterations in the ECG, 1 having A-V block. Of the 58 men who were M-G positive, 48 had normal ECG tracings, the remainder had complete right bundle branch block, disturbance of ventricular repolarization, etc. Thus the immediate prognosis in the latent stage is good provided there are no ECG changes or increase in the size of the heart, but once cardiac lesions are established the prognosis is much less favourable.

Out of 218 patients with chronic Chagas's disease, symptoms of cardiac insufficiency appeared in 85 aged between 11 and 30, the chief initial symptoms being dyspnoea on exertion in 50% and oedema of the lower limbs in about 25%. In the author's cases the duration of the latent phase was between 10 and 40 years. If frank cardiac insufficiency develops the prognosis becomes bad, and out of 166 chronic patients, treatment was abandoned or death occurred within 6 months in 35. The course of the disease is more rapid in patients under 30 years of age and death may occur suddenly in these younger patients though it is more usually from cardiac insufficiency.

The principal complications are from thrombo-embolism and usually occur after the development of cardiac insufficiency. Embolism of the various limb vessels was not seen though infarcts occurred elsewhere, often in the kidneys.

W. K. Dunscombe

RÊGO, S. F. de M. Sôbre o encontro de formas tissulares do *Trypanosoma cruzi* Chagas 1909 no sangue circulante do camundongo branco (*Mus musculus*). [**Occurrence of Tissue Forms of *Trypanosoma cruzi* in Blood Stream of Mice**] *Folia Clin. et Biol.* S. Paulo. 1956, July–Dec., v. 26, Nos. 1/6, 17–45, 57 figs. [20 refs.] English summary.

The author found in the circulating blood of experimentally infected mice stages of *Trypanosoma cruzi* which typically develop in the host's tissues. In order to ascertain whether these forms were present in the blood normally or were introduced into it by accident from the tissues, in the course of collecting the material, the author examined the blood of infected mice at regular intervals, in material obtained from the tail, from the heart and in sections of the whole heart.

In all the mice leishmanial forms were seen in blood films 5–11 days after intraperitoneal inoculation, while from the 6th day onwards all intermediate stages of the development of *T. cruzi* from these forms to trypanosomes (*viz.* leptomonads and crithidia) were also encountered. In addition to these free forms, from the 8th day there also appeared in the blood macrophages, monocytes and—in one case—neutrophils containing leishmanial forms. Forms showing signs of division were seen in all stages, including the trypanosomes. In general, the strain used in these experiments was characterized by marked reticulotropism. In impression smears of various organs, intracellular parasites in various stages of development were especially abundant in macrophages of the spleen, and, in smaller numbers, in the liver. The different forms of *T. cruzi* found in the blood are described in detail and illustrated by numerous figures. It is thought that the infected macrophages in the blood had originated from the spleen, while the free parasites were liberated by rupture of these cells. On the other hand, the parasites within the monocytes were probably phagocytosed by the latter. *C. A. Hoare*

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

MEIRA LINS, F. Leishmaniose visceral infantil em Pernambuco—Aspectos clínicos, hematológicos e electroforéticos. [**Infantile Visceral Leishmaniasis in Pernambuco**] *Anais Facul. Med. Univ. do Recife.* 1958, Dec., v. 18, No. 2, 215–39. [Numerous refs.]

This is a detailed report on 9 cases seen at Recife. The author first points out that in Brazil the incidence of the disease is not known, but that it attacks both adults and children. Of the 9 patients 6 came from Pernambuco State and the others from adjoining states.

Clinically, all the patients who had been cured parasitologically still had shotty enlarged inguinal and cervical glands together with enlargement of the liver. The respiratory tract was affected in all, with persistent cough often accompanied by bronchitis, which if it persisted under treatment was a bad prognostic sign. 1 patient had previously had malaria (*P. falciparum*), 1 patient

who died had had concomitant typhoid, and 1 had glandular, particularly mesenteric, tuberculosis and *Schistosoma mansoni* infection as well.

For diagnosis, if the spleen is palpable, puncture is completely accurate, but if it is not, puncture of the bone-marrow is easier and better. Examination of the peripheral blood has not given results sufficiently satisfactory to be considered a routine procedure in Brazil. 1 patient showed marked splenic metaplasia which is characteristic of the infantile disease. Electrophoresis showed a rise in globulin, particularly the gamma globulin with marked inversion of the A/G ratio; the electrophoretic changes run parallel with those in the bone-marrow.

The author states the disease is endemic in Pernambuco State and particularly in the coastal areas, and suggests a survey of incidence. *W. K. Dunscombe*

FORATTINI, O. P. Flebotomos transmissores das leishmaniosis na regiao neotropical. [**Species of** *Phlebotomus* **transmitting Leishmaniasis in the Neotropical Region**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1959, July, v. 3, No. 1, 193–207, 1 map. [Numerous refs.] English summary (9 lines).

This is a survey of the literature [up to 1956] on the biology of *Phlebotomus* and transmission of leishmaniasis in South America.

Natural infections with leptomonads attributed to *Leishmania brasiliensis* have been recorded from *Phlebotomus anduzei?, P. intermedius, P. longipalpis, P. migonei, P. panamensis, P. pessoai* and *P. whitmani. P. fischeri, P. cruciatus* and *P. shannoni* are also noted as anthropophilic and other species may be involved in transmission. The distribution of these species is shown in a map.

Notes are also given on the duration of life cycles (most species reared in the laboratory taking 40 to 70 days from the egg to the adult stage), laboratory breeding media, some natural breeding places and adult habits, and control.

B. R. Laurence

PIFANO C., F., ALVAREZ, A., ORTIZ B., I., DAGERT B., Cecilia & SCORAZ, J. V. *Phlebotomus panamensis* Shannon, 1926: transmisor de la leishmaniasis tegumentaria en Venezuela. [*Phlebotomus panamensis* **Shannon 1926: Transmitter of Cutaneous Leishmaniasis in Venezuela**] *Gac. Méd de Caracas.* 1959, Jan.–Mar., v. 67, Nos. 1–3, 229–35. English summary (8 lines).

Females of *Phlebotomus panamensis*, captured in the north of Venezuela, in the Guatopo region, Miranda State, were allowed to feed on man. Out of 7 persons bitten by this species, 1 developed a small nodule on the right arm 2 months later. This developed into an ulcer after 4 weeks and leishmanial bodies were demonstrated in cells from the ulcer. *B. R. Laurence*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

KIRK, R. **Rickettsial Infections in the Sudan Republic.** *J. Trop. Med. & Hyg.* 1959, Dec., v. 62, No. 12, 279–84, 1 fig. [16 refs.]

That fevers of the typhus group are comparatively rare in the Sudan, despite their prevalence in the adjacent countries of Egypt, Abyssinia and various parts of East Africa, has been observed by previous workers [this *Bulletin*, 1945, v. 42, 553 ; 1949, v. 46, 1021]. The present author, who has had long experience of medical research in the Sudan (but writes from the University of Malaya), reviews this subject with reference to the literature, governmental reports and case histories.

He refers to serological surveys [*ibid.*, 1940, v. 37, 198 ; 1949, v. 46, 1021 ; 1958, v. 55, 264] ; to a sporadic case of tick typhus in Equatoria ; to cases of epidemic typhus in the frontier town of Wadi Halfa in 1943–1944 and the rigorous steps taken to exclude spread into the Sudan ; to 2 cases of murine typhus in the Gezira ; to sporadic cases, one resembling mite typhus [*ibid.*, 1945, v. 42, 553] in the Gezira and in Khartoum ; and to Q fever [*ibid.*, 1954, v. 51, 788]. It seems that Q fever is of low incidence and probably unimportant, as clinical cases have not been recorded, and some of the positive serological findings may have been due to related infections.

The author concludes that while typhus fevers are not wholly absent from the Sudan, they seem to be rarely found there. *H. J. O'D. Burke-Gaffney*

COMBIESCO, D. *et al.* Le typhus exanthématique. Caractères cliniques, épidémiologiques, diagnostic de laboratoire et étude expérimentale du typhus exanthématique épidémique actuel. II–e. Mémoire. Épidémiologie du typhus exanthématique épidémique actuel. [**Epidemiology of Current Epidemic Typhus**]. *Arch. Roumaines Path. Expér. et Microbiol.* 1957, Sept., v. 16, No. 3, 321–47, 9 graphs. [20 refs.] III–e Mémoire. Première partie. Étude comparative sur les séroréactions de diagnostic dans le typhus exanthématique et leur importance épidémiologique. [**Comparative Study of Serodiagnostic Methods in Epidemic Typhus and their Epidemiological Importance**] *Ibid.*, Dec., No. 4, 495–506.

Studies carried out in the Suceava region of Rumania in 1953–1955.
See also this *Bulletin*, 1958, v. 55, 995.

GOLDWASSER, R. A., SHEPARD, C. C., JORDAN, M. E. & FOX, J. P. **The Specificity of Antibody Response in Typhus Fever. Its Alteration during Murine Typhus Infection as a Result of Previous Exposure to Epidemic Typhus Antigen.** *J. Immunology.* 1959, Nov., v. 83, No. 5, 491–5.

The antibody responses of volunteers who had been vaccinated with living (strain E) or killed (Cox type) epidemic typhus rickettsiae and subsequently

challenged with living virulent rickettsiae of epidemic and murine types, and the responses of unvaccinated volunteers, were studied by means of the fluorescent antibody (absorption) method [this *Bulletin*, 1959, v. 56, 932]. The specific antibody which developed after challenge was directed towards the infecting species in unvaccinated subjects. Subjects who were vaccinated and challenged with epidemic type rickettsiae, and the majority (5 out of 8) of those vaccinated with epidemic type and challenged with murine type rickettsiae, developed antibody for the epidemic type. These results indicate that persons who have been exposed to typhus antigen may not give a reliable specific antibody response if subsequently infected with rickettsiae of another type. "In the United States this would include vaccinated members of the armed forces, and former inhabitants of eastern Europe. The latter group contains the individuals in whom recrudescent epidemic typhus, or Brill's disease, might be suspected."

[These findings accord with results obtained in experimental infections of guineapigs and natural infections of human beings (this *Bulletin*, 1959, v. 56, 933). The paper will interest those concerned with the serological diagnosis of rickettsial infections.] *R. S. F. Hennessey*

NEAL, T. J. & LIPOVSKY, L. J. **Techniques for rearing the Chigger Mite, *Trombicula akamushi* (Brumpt).** *J. Econom. Entom.* 1959, Oct., v. 52, No. 5, 824–6, 2 figs.

White rats and baby chicks have been used as hosts for the larvae of *Trombicula*, and the eggs of the collembolan, *Sinella curviseta*, were used as food for the postlarval stages. The mites were reared together in wide-mouthed glass bottles (20 or more mites in 60 cc. containers) or individually in 1-drachm wide-mouthed glass vials. A mixture of 225 gm. of artificial dental stone, 5 gm. of Norit-A (decolorizing carbon) and 95 cc. of water was allowed to set in the containers, to form a substrate of plaster-charcoal three-quarters of an inch thick. The containers were kept tightly stoppered, at 27°C., and the substrate was moistened once or twice a week.

The postlarval stages were given collembolan eggs, 10 eggs per day for each nymph, 20 eggs per day for each adult mite, and, to obtain these, collembola were reared in ice-cream containers lined with the plaster-charcoal mixture and kept damp with 4–5 drops of water per day. Approximately 150 collembola were put into each container plus 0·2 gm. of dried yeast as food. Eggs were laid for about 4 days, and it was then found to be necessary to transfer the collembola to freshly prepared containers.

The larval mites were transferred to and from chicks by the use of a detergent solution (1 drop of detergent per 100 cc. of water) and were left on the chicks for 40 hours. The method of confining the larvae to the wing of the chick by a silk bolting sack, and a plastic cage for the chick, are described in detail. When the larvae were fed on rats, they were confined inside a capsule, made of glass and celluloid tubing and surrounded by a rubber foam band, which was fixed between the shoulder blades of the rats by silk sutures. The methods for making and attaching the capsule are given in detail. *B. R. Laurence*

LE GAC, P., GIROUD, P., RABY, C., DESTOMBES, P., BRES, P. & COURMES, E. L'escarre d'inoculation du typhus des broussailles indochinois. [**The Eschar of Scrub Typhus in Indo-China**] *Bull. Soc. Path. Exot.* 1959, May–June, v. 52, No. 3, 263–6, 4 figs. on 2 pls.

There is no elective spot for the eschar of scrub typhus. The mite bites at first contact with the body. Eschars are usually single, but the authors counted up to 11 widely distributed over the skin of one patient.

The histological structure of the eschar was examined in 5 patients. The ulcerated surface is heaped up and covered with a thin crust. The necrotic cellular nodular mass often extends into the hypodermis and is bounded laterally by round celled nodular infiltration sometimes of sweat glands, sometimes of small vessels which may be cuffed with lymphocytes and histiocytes or may be thrombosed. There is a total absence of polymorphs which differentiates the eschar from ordinary infective lesions.

Eschars were observed on people of all races in Indo-China.

B. G. Maegraith

YU, En-Shu, HWANG, Yu-Mo & LIU, Ch'un-Yen. [**Further Study on the Immunology of** *Rickettsia tsutsugamushi*] *Acta Microbiologica Sinica.* 1959, Nov., v. 7, No. 3, 189–96. [In Chinese.] English summary.

In previous studies the authors had demonstrated cross-immunity in mice, infected and treated with antibiotics, between 18 strains of *Rickettsia tsutsugamushi* from man, animals and mites in Fukien province. They have now shown such cross-immunity between 8 strains from different provinces and this immunity was maintained for more than 10 months against homologous and heterologous strains.

The authors also developed an intradermal test on rabbits in which they used a suspension of infected liver and spleen material; this reaction was negative in immunized rabbits. Non-specific immunity, when it occurred, produced some incomplete protection against antigenically unrelated micro-organisms. An experiment is described in which mice infected with virulent *R. tsutsugamushi* and treated with aureomycin or chloramphenicol were inoculated after 15–86 days later with Japanese B encephalitis virus. Survival was greater (77·2%) in these animals than in the controls (41·3%). The experiments were repeated 9 times and some protection was found each time; in 5 trials the results were statistically significant. *H. J. O'D. Burke-Gaffney*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

COLLIER, W. A. & DE WIT, M. J. **Culture of Yellow Fever Virus 17D in Ascites of Krebs-2-Carcinoma.** *Trop. & Geograph. Med.* Amsterdam. 1959, Sept., v. 11, No. 3, 281–6, 6 graphs. [16 refs.]

The aim of the main experiments described in this paper was to ascertain whether the yellow fever vaccine virus 17D could be subcultured in Krebs-2-

carcinoma growing in ascites form and, if so, whether such subculture brought about any change in the virulence of that virus for the white mouse. For the purposes of their enquiry the authors initiated a series of passages by inoculating white mice intraperitoneally with 0·2 ml. of undiluted ascites, obtained from mice infected with the Krebs-2-carcinoma strain, and, simultaneously, with 0·2 ml. of a 1 in 100 dilution of the 17D virus. After 7–8 days a small quantity of ascites was taken from the infected mice and 0·2 ml. of the fluid was subinoculated into a second series of white mice. Continuing this procedure, the authors succeeded in carrying out 60 passages during a period of more than a year.

At various intervals the virulence of the virus cultured in ascites was determined; ascites fluid was withdrawn at different times after infection and centrifuged, the clear fluid thereby obtained being serially diluted and 0·02 ml. of each dilution being inoculated intracerebrally into groups of white mice. In most cases the LD50 of the virus in the ascites passages was found to lie below 1/100 (0·02 ml. intracerebrally), whereas for the normal 17D strain it was distinctly higher.

Having thus found that in the ascites fluid of Krebs-2-carcinoma the 17D virus could be cultured " almost unrestrictedly ", but with consequential, marked decrease in virulence, the authors next sought to ascertain: (a) whether the weakened virus still retained the power to immunize, and (b) whether the decreased virulence of the cultured strain could be increased.

As regards (a), 2 series of white mice were inoculated intraperitoneally: series I, first with 0·25 ml. and later with 0·16 ml. of centrifuged ascites fluid with LD50 = 1/32; and series II, with 0·1 ml. of ascites with LD50 = 1/25 and then with 0·15 ml. of ascites fluid with LD50 = 1/132. The animals of both series were divided into 2 groups which, in common with the control mice, were then infected intracerebrally with 0·02 ml. of the 17D vaccine strain in dilutions of 1 in 10 to 1 in 100,000. Results showed the weakened strain to have produced strong immunity to the 17D vaccine strain, nearly to 1,000 LD50. In this connexion it was shown, however, that in mice similarly vaccinated as those in series I and II and later infected intracerebrally with the neurotropic 17D or Asibi strains, only very slight immunity to either strain had been produced. As regards (b), it was found that, as a result of intracerebral mouse passages, not only could the original virulence of the 17D vaccine strain be speedily regained but it could, apparently, also be increased in this way.

G. Stuart

MEERS, P. D. **Adaptation of the 17D Yellow Fever Virus to Mouse Brain by Serial Passage.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, Nov., v. 53, No. 6, 445–57, 5 figs.

17D yellow fever vaccine virus was passaged intracerebrally in 35-day-old mice and studied at the 1st, 3rd and 17th passage levels. The average survival time of mice for the same concentration of inoculum shortened from 14 days for the original vaccine to 10 days at the 17th mouse passage—this compared with 7 days for Dakar neurotropic yellow fever virus. A linear relation of similar slope was found between log dose and the reciprocal of the average survival time for all the preparations. The mortality ratios of young mice inoculated intraperitoneally and of infant mice inoculated subcutaneously were

compared for the different passage levels. Some deaths in the former occurred at all passage levels, including the original vaccine, but passage caused little change; in the latter there was an increase of pathogenicity with passage [the results appear to suggest interference in the higher dose levels].

Rhesus monkeys were inoculated intracerebrally with 5,000–16,600 mouse LD50 of the various passage levels. They were tested for viraemia 2, 4 and 6 days after inoculation. Low-titre viraemia was detected in all the monkeys and there was no difference between different passage-levels. The incubation period to onset of fever shortened from an average of 6·8 days for the original vaccine to 4·7 days with 17th passage virus. The incidence of encephalitis in the monkeys increased from nil with the original vaccine, to 1 of 6 with 1st passage virus, to 2 of 3 at the 3rd passage, to 6 of 6 at the 17th passage.

The incidence of encephalitis permitted by WHO for yellow fever vaccine is 2 of 6 monkeys. Only 1st passage virus fell within this limit.

C. E. Gordon Smith

COLLIER, W. A., DE ROEVER-BONNET, H. & HOEKSTRA, J. **Some Experiments with Dilution Media for Yellow Fever Virus in Virus Titrations.** *Trop. & Geograph. Med.* Amsterdam. 1959, Sept., v. 11, No. 3, 197–205, 24 graphs. [12 refs.]

As yellow fever virus remains active only in a diluent containing protein, it is essential for accurate titration experiments that all dilutions of virus be prepared in a diluent which will hold to a minimum the deterioration of the virus within the time required for the performance of such experiments. Among the diluents which have proved to be suitable in this respect are 10% normal human, monkey, rabbit or horse serum, 20% ascitic or pleural fluid—all in physiological saline solution—and 0·2%–0·75% bovine albumin [this *Bulletin*, 1957, v. 54, 1311] in buffered isotonic NaCl solution. In the experiments described in this paper the authors investigated the influence of various dilution media on the virulence of virus strains: the 17D vaccine strain (for the most part), the neurotropic 17D strain and the neurotropic Asibi strain.

Parallel virus dilution series were set up in tubes, the various media being used as dilution fluids. Immediately thereafter the tubes containing virus dilutions of 1 in 10 to 1 in 100,000 were placed in an ice-water bath. For titration purposes 5–6 white mice were injected intracerebrally with 0·02 ml. of each virus dilution, immediately after its preparation and after various time-intervals in storage, and then observed for 3 weeks or for a shorter period when the neurotropic strains were used. Virulence curves, according to Collier *et al.* [see *ibid.*, 1959, v. 56, 1122] were drawn during the tests by daily calculation of the LD50 (REED and MUENCH method) and by plotting these data in a curve. A very clear picture of the influence of the diluent on the virulence of the virus for mice was thus obtained. The following media were tested: 1% bovine albumin, 10% normal human serum, 20% mouse carcinoma ascitic fluid and brain suspensions of mice, chickens, rats and guineapigs. The main results are summarized.

With 1% albumin as diluent, the 3 virus strains showed only slight decrease of virulence after 4 hours' storage at 0°C., but after 24 hours at that temperature all 3 had experienced a marked decrease, *e.g.* from log 5·9 to log 2·2 in the case of the neurotropic 17D strain. With 10% normal human serum as diluent, 17D vaccine virus showed no decrease in virulence after 1 hour at

0°C., but a moderate decrease after 4 hours at 0°C. With 20% mice ascitic fluid (inactivated) as diluent, virulence had not decreased after 4 hours' storage, but had definitely decreased after 24 hours' storage at 0°C. With 10% chicken embryo suspension as diluent, only a slight decrease of virulence was observed after 1 hour and after 3½ hours at 0°C. With 10% normal mouse brain suspension as diluent, 17D vaccine virus showed no decrease in virulence either after 1 hour or after 3½ hours at 0°C. Moreover the neurotropic 17D strain showed no decrease in virulence after either 4 hours or 24 hours at 0°C.

Comparison of the influence exerted on virulence by the above media in dilution series after storage at 0°C. showed: that virulence was preserved better with 20% mice ascitic fluid than with 1% bovine albumin after 24 hours' storage; that 1% bovine albumin gave better results than either 10% normal human serum or 10% chicken embryo suspensions after 4 hours' storage; that 10% normal mouse brain suspension preserved virulence better than 0·5% or 1% bovine albumin after both 4 hours' and 24 hours' storage; that dilution of the neurotropic 17D strain in 10% normal mouse brain preserved a much higher level of virulence (log 5·5) than did dilution in 1% bovine albumin (log 2·1) after 24 hours' storage; and that 10% mouse brain suspension preserved the virulence of 17D vaccine virus better than either 10% normal human serum or 10% normal chicken embryo suspension both after 1 hour's and after 3½ hours' storage. "These tests showed that suspensions of normal mouse brains may be very useful in preserving the virulence of dilution series of yellow fever virus for longer periods of time."

Further experiments with normal brain suspensions of other animals showed: that 10% chicken brain suspension and 10% guineapig brain suspension alike gave better results than 1% bovine albumin after 4 hours' storage at 0°C. and that in preserving virulence there was little difference between 10% normal rat brain suspension, 10% rat brain inactivated for 20 minutes at 56°C. and 1% bovine albumin after 3½ hours at 0°C.

From the results of their investigations the authors found 10% normal mouse brain suspension to be exceptionally suitable as a "solution-medium" for yellow fever virus. With that medium as diluent, there was no loss of virulence, even after 24 hours' storage at 0°C. *G. Stuart*

PORTERFIELD, J. S. **A Plaque Technique for the Titration of Yellow Fever Virus and Antisera.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, Nov., v. 53, No. 6, 458–66, 3 figs. (2 on 2 pls.).

Cells from trypsinized 10-day chick embryos were grown in monolayers for 24 hours, then infected and overlaid with an agar medium. High cell concentrations were used—10–12 × 10^6 cells per ml., 5 ml. per 2-inch Petri dish. With 17D yellow fever virus, plaques appeared on the 4th day, but the cell sheet degenerated on the 5th day where the overlay medium was buffered with bicarbonate; when Tris buffer was used in the overlay the cell sheets survived much longer and plaques were readily counted on the 6th day. The plaque count was directly related to the dilution of the inoculum. The plating efficiency was about 2%. Increasing titres were obtained by increasing the time of absorption of virus before applying the overlay—a 2-hour absorption period was adopted routinely. *p*Hs from 6·4 to 7·6 were used for absorption and

7·2 found to be the optimum. Consistently higher plaque counts were found when Tris was used instead of bicarbonate alone.

Neutralization tests were carried out by mixing dilutions of inactivated antisera with virus, incubating for 2 hours at 37°C., then plating the mixtures on the monolayers. After absorption the monolayers were washed and overlaid. The serum titre was taken as the dilution capable of reducing the plaque count by half. A serum with a titre of 1 in 240, neutralized 1500 LD50 of virus when used undiluted in an intracerebral test in mice. In a neutralization test with 17D virus, normal human and rabbit sera gave no neutralization; sera from persons 1–3 years after yellow fever vaccination reduced the plaque count to about 20%; sera of persons recovered from natural yellow fever infections gave almost complete neutralization; Uganda S and West Nile hyperimmune sera gave a 50% reduction, while Zika and western equine encephalomyelitis antisera gave no neutralization.

[This is an important new technique which may in time develop to replace mice for much arborvirus work.] *C. E. Gordon Smith*

DENGUE AND ALLIED FEVERS

McLean, D. M. & Magrath, W. J. **Dengue in the Northern Territory.** *Med. J. Australia.* 1959, Nov. 14, v. 2, No. 20, 719–21. [11 refs.]

Since 1920, epidemics of dengue have occurred from time to time in the high rainfall coastal belt of Queensland and New South Wales [this *Bulletin*, 1927, v. 24, 627; 1944, v. 41, 242] and these appear to have been caused by dengue-1 virus. Dengue also occurs periodically in the Northern Territory and in the offshore islands. In February–March 1958 an epidemic of fever lasting 7–10 days, with aching, backache, cough and sore throat, occurred on some of these islands. By mid-March there were 40 patients at Oenpelli Mission in Arnhem Land, 150 miles east of Darwin. *Aëdes aegypti* are numerous in the area at this time of year.

The disease was first thought to be influenza and throat washings were tested for virus. Paired sera were obtained from 12 patients. These were tested in mice for neutralizing antibody to Murray Valley encephalitis, dengue-1 and dengue-2 viruses. 5 patients had Murray Valley antibody in both acute- and convalescent-phase sera. 6 patients also had dengue-1 neutralizing antibody in both serum specimens. A significant increase in dengue-1 antibody was demonstrated in 3 patients. 2 patients had no dengue-1 antibody in either specimen. No dengue-2 antibody was detected in any serum. It seems probable that the disease was caused by dengue-1 virus. *C. E. Gordon Smith*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

GIRARD, G. Considérations sur l'épidémiologie de la peste. Caractéristiques des centres endémiques asiatiques et africains. [**Observations on the Epidemiology of Plague. Characteristics of the Endemic Centres in Asia and Africa**] *Rev. Med. et Hyg. d'Outre-Mer.* 1959, Oct. 15, v. 31, No. 281, 114–20. [14 refs.]

The author discusses the characteristics of the permanent foci of plague in India, Indonesia and Africa. These have been described as moderately cold and humid regions in the foothills of mountains or on plateaux, usually at considerable altitude. He points out that the discovery of the role of the flea in the epidemiology of plague has led to understanding of the climatic conditions which, in countries so different, facilitate the survival and activity of plague-infected fleas so as to constitute permanent endemic foci. Resistance on the part of the rodent hosts is of subordinate importance.

In support of his views he refers to the work of ESTRADE in Madagascar [this *Bulletin*, 1934, v. 31, 879] who found infected fleas living free in huts in dust containing cereal debris. His experiments showed that the vector flea's length of life and ability to survive away from its rodent host were determined by the saturation deficiency of the atmosphere. This explains the focal endemicity of plague in Madagascar. The activity of the flea and thus the seasonal incidence of plague is determined predominantly by temperature; though fleas were more numerous on rats in winter than in summer they were not active and there was no transmission. The importance of the ability of the flea to survive apart from its rodent host in endemic foci is stressed.

T. H. Davey

MISONNE, X. Les rongeurs des foyers de peste congolais. [**Rodents of Plague Foci in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1959, Aug. 31, v. 39, No. 4, 437–93, 1 map. [29 refs.]

Plague in the Belgian Congo is endemic in two foci—around Blukwa, north west of Lake Albert, and around Butembo, north west of Lake Edward. Both areas are situated between 1,400 and 2,000 metres above sea level and are intensively cultivated, with a settlement of 200 or more inhabitants per square kilometre, and are in savannahs lying between tropical and montane forests. These savannah foci contain a high rodent density compared with the neighbouring forests and essentially the same rodent fauna is found in both areas.

Cases of human plague have been recorded in each year around Blukwa between 1928 and 1956, and there is some evidence of a cyclical increase in human cases every 5–6 years. Around Butembo human cases of plague have been recorded in each year between 1938 and 1957, except 1954. There was some evidence that the numbers of infections per year in the two localities were correlated ($r = 0{\cdot}503$). Most human infections are found between May and October but have been recorded in every month of the year. Certain villages are shown to be more liable to plague than others found in the same focal area.

Infections of rodents and fleas [unspecified] have also been recorded in all months of the year, and 13 species of wild rodents (Muridae) and 2 genera of insectivores (Soricidae) have been found infected in nature. There are only 2 domestic rodents of importance in the two areas, *Rattus rattus* and *Mastomys natalensis*, and *R. rattus* was not found at Blukwa until recently (1958). In the villages 25–50% of the huts contain rats, an average of 2–4 rats being found in each hut. The two domestic rats were found to be restricted to a range of about 50 metres from the huts. In addition to the domestic rodents, 3 species live in the immediate surroundings of the villages, *Arvicanthis abyssinicus*, *Leggada minutoides* and *Claviglis murinus* (not at Blukwa) and are peridomestic, entering the huts at night, and *A. abyssinicus* (1 per 24 huts) is believed to be the principal intermediary between wild and domestic rodents in the transmission of plague.

Observations on the numbers and fluctuations of the domestic rodent population are given in detail and there are also very valuable observations on the habitats and associations of the wild rodents, which provide evidence of the possible route of plague transmission in the wild and domestic populations. The degrees of association found between the different genera show that 3 wild rodents are in frequent contact—*Otomys*, *Oenomys*, *Lophuromys*—and that transmission to the villages takes place through contact between *Lophuromys* and *Arvicanthis*. During the dry season, a number of species of rodent congregates in more humid areas and this tends to interrupt transmission to the villages on escarpments, but during the rains the continuity of infection is resumed. Generally, plague was found to be more numerous in places where rodents were more abundant, and in villages where plague was absent the rodent population was less than 50 per hectare. An appendix to the paper provides a key for the identification of the rodents of this part of Africa.

[This is a valuable paper and should be consulted by all who are interested in the transmission of plague and especially for the methods of the investigation. As the author points out, the resistance of the rodents to infection, and of the fleas, is not yet known.] *B. R. Laurence*

HEISCH, R. B. **Is the Rat (*Rattus rattus*) ever a Permanent Reservoir of Plague?** [Memoranda.] *Brit. Med. J.* 1959, Dec. 19, 1385.

In 1952 the author showed that wild rodents were the permanent reservoir of plague in Kenya [this *Bulletin*, 1953, v. 50, 110]. In wild rodents the infection tends to persist in areas once invaded; these rodents are markedly resistant and may harbour *Pasteurella pestis* without signs of the disease. Such inapparent infections are demonstrated by pooling of tissues or fleas or both and inoculating guineapigs; in this way otherwise undetected sylvatic plague may be revealed. Such isolations from healthy rodents or their fleas during interepizootic periods strongly suggest that they are permanent reservoirs of plague.

Rattus rattus is, however, unlikely to be a permanent reservoir of plague in Kenya; these rats are very susceptible, but the infection quickly dies out and *P. pestis* has not been isolated from them or their fleas during interepizootic periods [see, for example, *ibid.*, 1954, v. 51, 264]. On the other hand, in other endemic areas rats may show a marked resistance and develop inapparent infections; this has been reported from India, Brazil [*ibid.*, 1935,

v. 32, 448] and the Belgian Congo [*ibid.*, 1940, v. 37, 828; 1949, v. 46, 737] but POLLITZER [*ibid.*, 1954, v. 51, 792] points out that it was never claimed that such rats played a part in perpetuating plague.

It is not clear whether these inapparent infections in commensal rats were found between epizootics or during them (when the rats may have been incubating plague or convalescing from it). Efforts should be made to isolate *P. pestis* from rats and their fleas during the interepizootic period which is the critical one. The uncertainty as to whether rats are a permanent reservoir in other countries may be partly explained by the fact that pooling techniques—so valuable in sylvatic plague—have not been used widely in the search for plague in commensal rats.

The author quotes MEYER [*ibid.*, 1958, v. 55, 31] in stating that certain highly susceptible rodents are not permanent reservoirs of *P. pestis*; but he points out that this does not take into account that fact that susceptible species such as *R. rattus* may develop a marked resistance; "susceptible" and "resistant" are relative terms when applied to rodent species and the complex matter of persistence of focal plague seems to depend on the presence of rodents having either of these features. It can of course be argued that the fleas are the chief reservoirs of plague. "Wild rodents and their fleas are of primary importance in the perpetuation of plague, but it seems doubtful whether the commensal aspect of the reservoir problem is quite in perspective."

[See also this *Bulletin*, 1960, v. 57, 29.] *H. J. O'D. Burke-Gaffney*

BRYGOO, E. R. & RAJENISON, S. Présence de *Centetipsylla madagascariensis* (Rothschild) 1900 sur *Rattus rattus* de Tananarive. Observations sur les variations de la faune pulicidienne des rats de Tananarive. [**Observations on the Flea Fauna of Rats in Tananarive. Presence of** *Centetipsylla madagascariensis* **on** *Rattus rattus* **in Tananarive**] *Arch. Inst. Pasteur de Madagascar.* 1959, v. 27, 53–7.

The main part of this paper compares the numbers of fleas captured on black rats in Tananarive in the years 1923, 1931, 1941 and 1951–1958. *Xenopsylla cheopis* formed 60–95% of the population of fleas in 1923, 1941, 1957 and 1958, but *Echidnophaga gallinacea* (75%) and *Ctenocephalides canis* (66%) were the predominant species in 1931 and 1951 respectively. The number of fleas per rat has been reduced since 1950 from numbers above 6 to less than 0·3 after the use of [unspecified] contact insecticides. Other fleas captured on the rats were *Synopsyllus fonquerniei*, *C. felis*, *Leptopsylla segnis*, *Pulex irritans* and *Centetipsylla madagascariensis*, the last species known previously only from the tenrec (*Centetes*). *B. R. Laurence*

COVA GARCÍA, P. & TALLAFERRO D., Elizabeth. Pulgas mas comunes de Venezuela. [**The Common Fleas of Venezuela**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1959, July, v. 3, No. 1, 327–48, 6 figs. [11 refs.]

This paper includes a key to the fleas recorded from Venezuela and a host list for the 29 species and varieties recorded. *Ctenocephalides felis*, *Polygenis bohlsi bohlsi*, *P. b. jordani*, *P. klagesi samuelis*, *P. roberti beebei*, *Pulex irritans* and *Xenopsylla cheopis* are recorded from the black rat, *Rattus rattus*, as well as from other animals. *X. brasiliensis* is recorded only from *R. rattus*.

Other hosts of *X. cheopis* are *Rattus norvegicus*, *Sigmodon hispidus hirsutus*, and the opossum *Didelphis marsupialis*.

Tunga penetrans is recorded from man and *Sus scrofa*. *B. R. Laurence*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

BESSEIGE, H. & RIGAUD, J. L. L'amibiase aurait-elle un nouveau visage au Vietnam? [**Has Amoebiasis altered in Character in Vietnam?**] *Bull. Soc. Path. Exot.* 1959, July–Aug., v. 52, No. 4, 477–83.

Examination of reports of the laboratory at Grall Hospital (Vietnam) in the period 1953–1958 showed a remarkable fall in the recorded incidence of *Entamoeba histolytica* in stool specimens. In 1953 18,268 were examined and 21% of them contained this parasite; the figures fell to 13% of 5,743 in 1956; to 5% of 5,903 in 1957; and to 2% of 5,253 in 1958. Clinical amoebic dysentery has correspondingly diminished locally, though least in the Europeans. The authors state that before 1940 in Vietnam acute amoebiasis was, especially in Europeans, notoriously a common and grave disease, and one of the most important in the country. They discuss in some detail many factors, notably wars and their ensuing periods of peace, bearing on this fall in the incidence of the infection and of the gravity of the resultant disease. It is in spite of wars and all they have entailed in local population movements and changes, in defective sanitation, lack of drugs, and the hardships suffered, that the incidence of active amoebiasis has declined in this surprising manner. It appears that the decline coincided with the repatriation of the French [European] expeditionary force on the conclusion of the war in Indo-China.

In comment M. RIOU said that since 1954 in Saigon there had rarely been any severe or grave amoebiasis, though the mild clinical forms were common there. He had been director of a laboratory in Hanoi from 1936 to 1945; study of the reports of this laboratory during that decade showed the incidence of *E. histolytica* infection to have steadily increased, but its manifestations were rarely serious, even in Europeans there.

[The arguments of the authors of the original paper are difficult to follow. They seem to infer that it is the presence of the non-immune Europeans that leads to an exaltation of the virulence of the parasite. When these depart the local population ceases to be troubled by amoebiasis in an abnormal manner, and its incidence and pathogenicity in them decline to proportions normal to the indigenous inhabitants of the area.] *A. R. D. Adams*

COUTINHO, J. de O. Contribuição para o Estudo da Epidemiologia da Amebíase. [**Contribution to the Study of the Epidemiology of Amoebiasis**] [Thesis.] 142 pp., illustrated. [Numerous refs.] 1959. São Paulo.

This thesis is devoted to a study of the epidemiology of amoebiasis in general and with special reference to conditions in the township and district of Itatiba

in the state of São Paulo, Brazil. A detailed account is given of the local incidence of infection with *Entamoeba histolytica*, which is compared with that of other intestinal protozoa and helminths. The author then gives a critical review of the state of our knowledge regarding the host-parasite relations in, and the transmission of, amoebiasis and considers the epidemiological situation in the locality studied by him. The present survey revealed an incidence of 23·8% among the urban population and 26·1% in the rural area. In general, it was found that the prevalence of infection was closely correlated with the degree of sanitation. There was no evidence of familial transmission of amoebiasis, but there is reason to believe that the infection is disseminated to some extent by schoolchildren. *C. A. Hoare*

KRUPP, Iris M. & FAUST, E. C. **Parasitologic Surveys in Cali, Departamento del Valle, Colombia. IV. Experimental Study in Guinea Pigs of the Pathogenic Capacity of *Entamoeba histolytica* from Infected Persons in Ward Siloé, Cali.** *J. Parasitology*. 1959, Aug., v. 45, No. 4, 449–55. [14 refs.]

In previous parts [this *Bulletin*, 1958, v. 55, 1110; 1959, v. 56, 1236] it has been shown that 40% of the population in Cali, Colombia, are infected with *Entamoeba histolytica*, four-fifths harbouring the large race, and one-fifth the small race; moreover in the great majority of cases the infection is symptomless. In the present paper an account is given of experiments carried out with the object of determining the pathogenicity of the local strains. 14 strains were tested in young guineapigs by feeding them on concentrated cysts obtained from human stools and by intracaecal inoculation of cultures containing trophozoites. The animals were killed at intervals from 2 to 11 days after the infective feed or inoculation; their caeca, together with adjacent parts of the gut, and liver were examined macro- and microscopically, as well as in sections, for evidence of ulceration.

In 7 out of 38 guineapigs (19·4%) fed on cysts, the caecum was infected, with invasion of its wall in 1–2 animals. Among the 103 animals inoculated with trophozoites, 64 (62·1%) became infected, with invasion of the caecal wall in 53 (51·4%). The lesions varied from mucosal erosion to deep ulceration.

It is concluded "that residence of *E. histolytica* in the large intestine of an indigenous human population in a tropical area in Colombia without clinical manifestations of amebiasis has not incapacitated this ameba to invade the cecal wall of the guineapig and produce moderate to fatal ulceration".

C. A. Hoare

ROBLEDO, Efiginia, NAVARRETE, F. & PORTILLA, J. Diagnóstico de Laboratorio de la amibiasis y otras protozoosis intestinales. [**Laboratory Diagnosis of Amoebiasis and other Intestinal Protozoal Infections**] Reprinted from *Medicina*. Mexico. 1959, May 25, v. 39, No. 820, 209–13. [16 refs.]

MODY, V. R. **Corticosteroids in Latent Amoebiasis.** [Correspondence.] *Brit. Med. J.* 1959, Dec. 19, 1399.

The author refers briefly to 2 patients in the Hospital for Tropical Diseases, London, with intermittent diarrhoea and bleeding *per rectum*, in whom latent *Entamoeba histolytica* infection was revealed after corticosteroid therapy.

The first patient, from Colombo, had had an exhaustive examination to exclude amoebiasis, and a diagnosis of non-specific ulcerative colitis was suggested. Treatment by retention enemata of hydrocortisone hemisuccinate was begun, but temporarily suspended for a week for personal reasons. The patient felt much better but blood and mucus appeared in the stools; in the stools and scrapings from bleeding ulcers swarms of *E. histolytica* trophozoites and cysts were found.

In the second patient, from Hong Kong, amoebiasis had also been excluded by careful examination. The patient was treated for non-specific proctocolitis with Predsol suppository (5 mgm. prednisolone) twice daily for a month. Profuse infection with *E. histolytica* trophozoites was found in the stools and scrapings from ulcers.

The author points out that cholesterol has been shown to be a growth factor for *E. histolytica* [this *Bulletin*, 1945, v. 42, 36; 1949, v. 46, 40; 1959, v. 56, 1134] and suggests that investigation is desirable to see whether corticosteroids might act in this way by altering the environmental conditions of *E. histolytica* and whether oral or local application of them might unmask latent infections. *H. J. O'D. Burke-Gaffney*

CAVIER, R. Acquisitions récentes en thérapeutique antiamibienne. [**Recent Advances in the Treatment of Amoebiasis**] *Méd. Trop.* Marseilles. 1959, Nov.–Dec., v. 19, No. 6, 619–45. [269 refs.]

VELASCO GARCIA, F., GOMEZ NAVARRETE, H. & GARCIA V., V. M. Un nuevo estudio sobre el tratamiento de la amibiasis intestinal con el N-(beta-oxietil)-N-p-fenoxibencil (4′nitro) dicloroacetamida. [**A New Study of the Treatment of Intestinal Amoebiasis with N-(beta-oxyethyl)-N-(p-phenoxy-(4′nitro)-benzyl)-dichloroacetamide**] Reprinted from *Prensa Med. Mexicana.* 1959, Oct., v. 24, No. 10, 437–8.

The authors, from Mexico, refer [but without references] to a previous study of the use of the drug described in the title, and known as Mebinol [this *Bulletin*, 1959, v. 56, 1030] in the treatment of *Entamoeba histolytica* infections. They had obtained 90% success with 50 patients treated with 6 tablets (each of 250 mgm.) daily for 10 days. As they consider that these doses exceeded the minimum concentration inhibitory to *E. histolytica* they have now tried the effect of 3 tablets daily (750 mgm.) for 20 days in 26 inmates of a penitentiary, 21 with symptoms of chronic amoebiasis and 5 in the acute stage; the former harboured scanty cysts of *E. histolytica* and the latter passed abundant cysts [trophozoites are not mentioned]. 5 of those with chronic infections had been treated unsuccessfully by the first regime and 3 had been treated with apparent success and were regarded as re-infections. The 5 patients with acute disease had received no previous treatment. In view of their acute symptoms one was first given 6 tablets daily for the first 10 days and 3 daily for the second 10; the other 4 were given 6 tablets daily for the first 3 days and 3 tablets daily for the next 17.

3 stool examinations were made before treatment, after treatment and for the following 2 weeks. 22 patients were freed of parasites, the 4 who continued to be positive had previously been treated with Mebinol and other

amoebicides and were therefore highly resistant. Only one patient showed side effects, which did not necessitate suspension of treatment, compared with 7 of the 50 in the earlier study.

The same proportion of successes was obtained with the reduced doses as with the original regime. However, the authors consider that in general the regime of choice should be 6 tablets a day for 10 days, except where intolerance to Mebinol is encountered when the reduced dose of 3 tablets daily for 20 days is recommended. *H. J. O'D. Burke-Gaffney*

GUIDICINI, F. & SPREMOLLA, G. **"Treatment of Intestinal Amebiasis with N-(beta-oxyethyl)-N-(p-phenoxy (4′-nitro)benzyl)-dichloroacetamide or Chlorophenoxamide". (Clinical Observation.)** Reprinted from *Gaz. Sanitaria.* 1959, v. 8, No. 6, 9 pp. [12 refs.]

This compound [Mebinol] is claimed to be amoebicidal *in vitro* to a degree superior to that of other amoebicidal drugs in clinical use, and it is of extremely low toxicity in therapeutic use. 10 patients with *Entamoeba histolytica* infections which caused large bowel symptoms, and 5 free from these but "carriers of the 'minuta' form" of the parasite, were treated with 6 tablets (1,500 mgm.) of Mebinol daily for 10 days. Repeated coprological tests were made during treatment, and, it is stated, at 1, 3 and 5 months after its end [though no exact details are given]. Many biochemical tests, assays and other laboratory examinations were undertaken. In all these cases *E. histolytica* disappeared from the stools by the end of the treatment; other parasites when present in the bowel were unaffected by it. The laboratory examinations showed a reduction in the absolute and relative numbers of circulating eosinophils; this is attributed either to the destruction of the parasites or to improved adrenal activity. There was a fall in serum mucopolysaccharide levels; this is considered to be indicative of a reduction in inflammation. The hepatic function tests showed improvement in function in all cases. This drug, the authors conclude, is the most effective so far used for the treatment of intestinal amoebiasis; it has the additional virtue of restoring hepatic function—which is impaired almost constantly in this condition.

[In this paper appears a large table listing the results of numerous laboratory tests done on the 15 patients studied. An identical table is published in the paper by DE CARNERI, summarized below. The various authors apparently work in collaboration under a single direction. The clinical and parasitological findings in these 15 cases are set out in another table and also are referred to in the text in the present paper; but the information given in both appears to the abstracter to be insufficient to substantiate the authors' very large claim of remarkable therapeutic superiority of the drug.] *A. R. D. Adams*

DE CARNERI, I. **Chemoprophylaxis of Amebiasis. With an Appendix on the Use of Mebinol, a New Dichloroacetamide Derivative.** Reprinted from *Pubbl. Chim., Biol. e Med.* Milan. 1959, v. 3, ii + 37 mimeographed pp., 2 figs. on 2 pls. [Numerous refs.]

The author discusses the incidence of *Entamoeba histolytica* infection in sundry parts of the world, the proportion of patients with this infection in

those areas who show clinical manifestations of it, and the explanations offered for these differences. He then turns his attention to the chemotherapeutic means whereby the infection may be prevented from establishing itself in the bowel, or whereby it may be eradicated while living within it commensally and so prevent its penetration into tissue, with the development of lesions and clinical signs of their presence.

Periodic treatment of individual people with a suitable chemotherapeutic agent is the method he advocates. The effect of this is to destroy the "*minuta*" forms arising from the primary infection, and thus to forestall their translation into the tissue invasive "*histolytica*" forms. Arsenic or iodine compounds he thinks would be likely to cause toxicity. Mebinol (chlorophenoxamide) [N-(*beta*-oxyethyl)-N-(*para*-phenoxy-(4′-nitro)-benzyl)-dichloroacetamide] [see this *Bulletin*, 1958, v. 55, 1013; and 1959, v. 56, 165, 834, and 1030] he considers to be the drug of choice for the purpose. It is an effective amoebicide in very low concentrations (1 μgm./ml.); it is stable and only slightly absorbed from the bowel; it is harmless to the normal intestinal flora, mycetes, protozoa or metazoa; it is cheap; and it produces no evidence of toxicity. Chemical tests indicate that when given twice weekly, on separate days, a concentration of the drug greater than that needed to kill amoebae in contact with it is excreted in the stools daily. It is claimed that when so given in an experiment in a suburb of Bombay it gave excellent results (100% prophylaxis where 34% of controls were infected). *A. R. D. Adams*

De Carneri, I. Le basi biologiche della chemioprofilassi dell'amebiasi. [**The Biological Basis of Chemoprophylaxis of Amoebiasis**] *Parassitologia*. Rome. 1959, Oct., v. 1, No. 2, 113–27. [Numerous refs.] English summary.

Maddison, S. E., Powell, S. J. & Elsdon-Dew, R. **Bacterial Infection of Amoebic Liver Abscess.** *Med. Proc.* Johannesburg. 1959, Nov. 28, v. 5, No. 24, 514–15.

Characteristically bacteria are found in only a minority of cases of amoebic abscesses of the liver. The authors, from the Amoebiasis Research Unit, Durban, examined the liver pus from 75 Africans with uncomplicated amoebic liver abscess to determine the incidence of bacterial infection and how frequently bacteria may have been introduced by intervention. *Entamoeba histolytica* was found in 63 cases.

In addition to primary aspiration, up to 5 more aspirations were performed in 34 patients. Pus smears were stained by Gram's method and cultures were made in broth and cooked-meat medium. Cultures were incubated for 21 days and examined for bacterial growth once a week. Direct smears were negative for bacteria in all 75 primary aspirations. Cultures were sterile in all but 2; one of these yielded *Aerobacter aerogenes*, but second and third aspirations were sterile; the other also yielded *A. aerogenes* and 3 additional aspirations from the same patient gave a mixed growth of *A. aerogenes* and *Escherichia coli*; the clinical picture suggested infection at the time of initial aspiration. Subsequent aspirations yielded bacteria in 5 more cases; in 2 there were coagulase-negative staphylococci, in one *Pseudomonas pyocyanea*, in one *E. coli*, and in the fifth non-haemolytic streptococci and *E. coli* were found

at the third and fourth aspirations. In all those cases in which bacteria were found, *E. histolytica* was also present. The patients were given broad-spectrum antibiotics as well as amoebicides: 4 patients responded, but surgical drainage was required in the 2 from whom *E. coli* was isolated.

Data regarding bacterial infection in amoebic liver abscess are misleading unless it is known whether this has resulted from a complication of the disease or from introduction during aspiration. Contaminants from syringes and needles may be grown on culture of the pus, falsely suggesting that the abscess has been infected with bacteria. A negative direct smear with a positive culture indicates probable contamination of the pus in this way and this occurred in 2 cases in this series.

The authors' experience suggests that introduction of bacteria during aspiration is the most important cause of secondary bacterial infection in unruptured amoebic liver abscess, and the finding of bacteria in 6 out of 75 cases indicates that this risk is not negligible. *H. J. O'D. Burke-Gaffney*

SOHIER, H. M. L. Traitement des abcès amibiens du foie par aspiration discontinue et injections médicamenteuses in situ. **[Treatment of Amoebic Liver Abscess by Repeated Aspiration and Local Injections]** *Bull. et Mém. École Nat. Méd. Pharm. de Dakar.* 1958, v. 6, 106–24, 9 figs. [136 refs.]

After consulting the English literature on the subject the author concluded that open drainage is not the only effective form of treatment for an amoebic liver abscess. He has now successfully treated several amoebic liver abscesses by repeated aspiration, with or without the local introduction of various solutions; but he considers that open drainage still may be necessary in some cases, especially when secondary infection of the abscess cavity has occurred.

Details are here given of 9 patients (4 European and 5 African) with amoebic liver abscesses who were treated by repeated aspiration and by flushing the cavity with antibiotics (streptomycin and penicillin) in saline solution. Dornokinase was introduced and left in the cavity on the first occasion. On the following day, after further similar lavage, Diodone (for X-ray depiction) and emetine were introduced. These procedures were repeated alternately after a lapse of 3 days; and later again as requisite through polythene tubes, 2 of which were introduced for the purpose under local anaesthesia after the fourth aspiration. Various methods of drip administration of antibiotic solutions and continuous gentle aspiration were tried; these were found to be unsatisfactory. Contemporaneously with these local treatments of the abscess cavity emetine, oxytetracycline, vitamin K and other specific and general forms of treatment were in progress. The patients all recovered within an average of 30 days—a period longer than that usual with open drainage—but the advantages included absence of further damage to the liver parenchyma and absence of the need for immobilization of the patient.

[Such repeated (up to 6) and prolonged aspirations of amoebic liver abscesses can but rarely have been found necessary by English workers, who also have not found it advisable or beneficial to introduce solutions or drugs into the abscess cavity. One or 2 aspirations, in conjunction with efficient parenteral emetine (or chloroquine) treatment, usually suffice. In the abstracter's opinion these interferences may well account for the unusually protracted course of the author's cases.] *A. R. D. Adams*

CHAUDHURI, R. N., SAHA, T. K. & ROY, N. **Amoebiasis—an Experimental Study.** *Bull. Calcutta School Trop. Med.* 1959, Jan., v. 7, No. 1, 1–2.

In an experimental study on amoebiasis in guineapigs the authors have used a metal tube which is inserted into the caecum. The tube is threaded on the inside and is about 1″ in length with a disk at the inner and a cap at the outer end. It is fixed to the abdominal wall by washer and nut, and 10 days after the operation, which in these experiments caused a 5% mortality, the animal is ready for experiment and seems to be little inconvenienced.

Infective material containing *Entamoeba histolytica* was added *via* the tube and the animals became infected and died of the infection. Drugs were given *via* the tube to other infected animals and the result was the same as when given by mouth. The course of the infection during treatment could be followed by withdrawing samples from the caecum. The authors believe the method could be of service in screening therapeutic agents.

[See also this *Bulletin*, 1959, v. 56, 726.] *J. D. Fulton*

BAYLET, R. J. Note sur la lambliase à Dakar. [**Note on Giardiasis in Dakar**] *Bull. Soc. Méd. Afrique Noire Langue Française.* Dakar. 1959, v. 4, No. 3, 346–8.

The author states that *Giardia* is the most important cause of parasitic enteritis seen regularly in Dakar. In nearly 5,000 stools examinations of European and African troops and their dependents he found *Giardia* infections in 21% of European children, 16% of African children and 6% of adults, accompanied respectively by 12%, 20% and 10% of other parasites.

He describes the two principal syndromes, the diarrhoeal and dyspeptic; these may alternate, and symptoms may be evident for 2 or 3 weeks, followed by periods of apparent cure, but in fact the condition tends to be very chronic. Febrile forms have been seen, but severe complications were not encountered.

The author does not accept the view that healthy carriers of *Giardia* are commoner than people with symptoms. He believes that careful interrogation will usually reveal the presence of existing or past intestinal symptoms in about half of those harbouring the parasite.

He has noted in some 10 patients repatriated to metropolitan France that, despite the presence of the parasite, the intensity of infection and severity of symptoms were less than they had been in Africa. He attributes this to climatic alteration in the biochemical state of the intestinal tract. He doubts whether giardiasis can be cured with certainty by means of current therapeutic agents. "*Cette parasitose ne guérit bien que si l'on évite de rechercher le parasite dans les selles après les traitements.*" *H. J. O'D. Burke-Gaffney*

QUEIROGA, A. L. & GALVÃO, P. G. "*Isospora belli*: três casos humanos encontrados na Paraíba". (Nota prévia.) [**Three Cases of** *Isospora belli* **Infection in Man in Paraíba, Brazil**] *Anais Facul. Med. Univ. do Recife.* 1958, Dec., v. 18, No. 2, 335–9, 1 fig. on pl. [Numerous refs.]

Apparently the first record from north east Brazil.

RELAPSING FEVER AND OTHER SPIROCHAETOSES

GALLIARD, H., LAPIERRE, J. & ROUSSET, J. J. Complément à la note sur le test d'identification des spirochètes récurrents. [**Further Observations on the Test for Identification of Relapsing Fever Spirochaetes**] *Bull. Soc. Path. Exot.* 1959, May–June, v. 52, No. 3, 269–71, 1 fig.

This note adds to the previous study of the protective power of 7 strains of spirochaetes on *Trypanosoma brucei* [this *Bulletin*, 1958, v. 55, 768; 1960, v. 57, 247] by recording a similar test with 2 more strains. These were (1) *Spirochaeta merionesi* from Morocco and (2) *Sp. crocidurae* from Dakar. The results obtained with all the strains are shown in a graph, from which it is seen that *Sp. merionesi* gave protection from the 17th to the 43rd day, with eventual cure, and *Sp. crocidurae* from 16 to 38 days.

The studies show that these 2 strains should be included in the group showing long survival (*duttoni-merionesi*) and that these characteristics correspond with other biological features recorded by other authors: the characteristics are set out in a table. *H. J. O'D. Burke-Gaffney*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

WEST AFRICAN COUNCIL FOR MED. RES. **Tuberculosis and Leprosy in West Africa. Proceedings of a Conference held at Jos, Northern Nigeria, February 18th to 20th, 1959** [LEWTHWAITE, R., President]. *West African Med. J.* 1959, Dec., v. 8 (n.s.), No. 6, 304–33, 4 figs. [24 refs.]

Session No. 7 of the Conference was devoted to the Epidemiology and Control of Leprosy, at which 3 papers were read, followed by discussion. The first of these is by C. M. ROSS (pp. 304–308), who writes on the epidemiology of leprosy in Northern Nigeria. In this region with a population of about 18 million varying in density from 25 to 204 per square mile, the Fulani, Hausa and Kanuri tribes occupy the north, the Nupe and Tiv occupy the south, while the hills and less accessible regions are occupied by some 40 pagan tribes. Leprosy is supposed to have been endemic on the plains for many hundreds of years, but has been introduced only more recently to the less accessible regions. Among the latter the incidence varies greatly from village to village, being 86 per 1,000 in some parts and even rising to 150 per 1,000 in some hamlets and villages. A scheme for mass treatment was begun in 1952, regular treatment being given to 166,000 patients; up to 1958, 20,000 patients had been discharged. Courses of training are given to medical officers, health visitors and auxiliary staff. Study is made of early symptoms so as to make early diagnosis and determine the length of treatment necessary.

The second paper is by J. A. DREISBACH (pp. 308–311), who writes on rehabilitation. With earlier treatment the majority of patients can be restored to their former condition and status. Deformity and loss of function must be

guarded against from the beginning of treatment by means of educating the patient in the dangers of injury and the precautions to be taken. Some details are given of various surgical procedures for restoration of function and cosmetic appearance.

The third paper is by R. E. PFALTZGRAFF on BCG vaccination as prophylaxis against leprosy in children (pp. 312–314). It was found that "in the three years prior to the administration of BCG 44 children developed leprosy out of 189, which gives an incidence of 23·3 per cent. After the administration of BCG in the same group of children 3 had developed leprosy during three years. Substracting from this the number previously having the disease, leaves a total of 145 susceptibles, giving an incidence of 2·0 per cent. This is less than one-tenth the incidence during the previous three-year period". In criticism of this paper it was suggested that results would have been more valuable if the BCG vaccination had been randomized. Another criticism was that a concurrent untreated control group should have been included.

The 8th Session of the Conference dealt with the Pathology of Leprosy. Three papers were read, followed by discussion.

The first paper is by T. F. DAVEY (pp. 317–321) on the immunological relationship between tuberculosis and leprosy with particular reference to the lepromin reaction. The late reaction to lepromin indicates the degree of non-specific response of the tuberculoid type, which may be induced by various substances. Where macrophages are unable to prevent the adaptation of the bacilli to life and multiplication within them, it is impossible for tissue immunity to develop and the lepromatous condition is likely to appear, starting first at sites most favourable to the bacilli. "Where the macrophages are able to maintain physico-chemical systems within them antagonistic to phagocytosed bacilli, and these degenerate, tissue immunity appears to develop and a tuberculoid histology is encountered.

"The capacity to do this in response to one member of the group of agents responsible may be carried over to another. *Myco. tuberculosis* is a powerful stimulator of this effect, other members of the group do so more weakly."

A paper by I. M. WEBSTER (pp. 322–324) is on the response of leprosy patients to small-pox vaccine. A study was made of the bacteriological index of 35 lepromatous patients to determine if it was influenced by vaccination. Of these, 6 who had been negative remained so, 19 showed a diminution in the bacillary count, 4 remained the same and 6 showed an increase. Of the 19 who had a decrease 9 became negative. In some patients the bacteriological index increased again after having diminished.

R. J. W. REES (pp. 325–329) writes on recent advances in leprosy research. He describes the application of quantitative methods to the increase of *Myco. lepraemurium in vivo* [this *Bulletin*, 1957, v. 54, 1420]. It was found that the bacilli divided every 10 to 12 days in the mouse and every 7 to 8 days in the rat. These are by far the longest generation times recorded for any micro-organism. From these calculations, in a comparison of human with rat leprosy, the incubation period for leprosy in man could be 2 years or more, which is consistent with clinical observations. After describing attempts to grow *Myco. lepraemurium in vitro* the author finishes by mentioning recent experiments in determining the viability of this organism by electron microscopy. It is found that while animals with untreated rat leprosy yield mainly "normal" bacilli, "degenerate" forms preponderate in animals receiving effective chemotherapy.

It is hoped by this rapid method to be able to follow the survival of leprosy bacilli *in vitro* and *in vivo*. *Ernest Muir*

ALONSO, A. M. **Criteria for a Natural Classification on Leprosy.** *Bol. Serviço Nac. de Lepra.* Rio de Janeiro. 1959, Dec., v. 18, No. 4, 293–301.

After explaining the difference between an artificial and a natural classification, the author goes on to criticize the classification proposed by the Indian Association of Leprologists. This includes 3 categories: Nonlepromatous (including 3 classes, tuberculoid, maculoanaesthetic and polyneuritic); Intermediate (including borderline and indeterminate classes); and Lepromatous. It is argued that if the Intermediate category is not Lepromatous then it must be Nonlepromatous. Exception is also taken to the inclusion of maculoanaesthetic and polyneuritic as separate classes "for they do not include distinguishable qualities as required for a classification". Both macules and anaesthesia are very commonly found in any leprosy type or group. The author upholds the classification adopted at the Madrid Congress. "It is according to the principles of a natural classification and rests solidly on four supports . . . : *clinical*, *histopathological*, *bacteriological* and *allergical*", or, as some would say, immunoallergical. *Ernest Muir*

FIGUEREDO, N. & MARTINS, A. B. **The Genesis of Leprosy Lesions.** *Indian J. Med. Res.* 1959, Nov., v. 47, No. 6, 622–35. [20 refs.]

The authors, as the result of the study of about 4,000 people in contact with leprosy patients over a period of 10 years, come to the conclusion that in the evolution of leprosy there are 3 phases: "an initial transient pre-sensitized phase (non-reactive to lepromin), the sensitized phase (infected and reactive to lepromin up to the tuberculoid stage) and the desensitized phase (lepromatous stage), the transitional stage between the sensitized and the desensitized phase being the dimorphous or intermediate stage." They conclude also that the lepromin reaction indicates sensitivity to the lepra bacillus and not resistance. The negative reaction to lepromin in lepromatous leprosy is due to the multiplication of bacilli beyond a certain limit in subjects whose resistance is not sufficient to prevent this multiplication. In tuberculoid patients the resistance (which varies in the community) has been sufficient to prevent multiplication beyond this limit, and they therefore remain sensitized, with positive lepromin reaction.

[This theory is worthy of careful consideration, and should be studied more fully in the original. The findings are shown in great detail.]

Ernest Muir

SILVA, C., TUMA, M., DOS SANTOS, E. M. & RISI, J. B. Confronto da reação de Mitsuda com as intradermoreações feitas com frações de micobactérias. [**Comparison of the Mitsuda Reaction with Reactions caused by Intradermal Injections of Fractions of Mycobacteria**] *Bol. Serviço Nac. de Lepra.* Rio de Janeiro. 1959, Dec., v. 18, No. 4, 310–16. English summary.

Fractions of *Mycobacterium tuberculosis* (BCG) were prepared: phospholipids, waxes and polysaccharides. The methods of preparation are first

described. The 3 suspensions were first tried on 6 lepromatous patients and 2 healthy children with negative lepromin reactions. There was a reaction of the tuberculin type within 24 to 48 hours with the polysaccharide fraction but not with the other 2 fractions. This reaction disappeared in a few days and there was no further reaction up to the fourth week. Tests on 38 persons with positive lepromin reactions gave the following results: 6 out of 12 on phospholipids showed nodules at the fourth week, as did 3 out of 15 on waxes; and 2 out of 11 on polysaccharides reacted slightly. The authors consider that because of the complete absence of reaction with phospholipids and waxes these substances might be used as a base for artificial lepromin. *Ernest Muir*

MONTESTRUC, E. & BENOIST, J. Les diagnostics dermatologiques différentiels rares de la lèpre: le granulome annulaire et la panniculite nodulaire non suppurative récidivante (maladie de Pfeiffer-Weber-Christian). [**Differential Diagnosis of Rare Skin Conditions from Leprosy: Granuloma Annulare and Nodular Non-Suppurative Recurrent Panniculitis (Pfeiffer-Weber-Christian Disease)**] *Bull. Soc. Path. Exot.* 1959, July–Aug., v. 52, No. 4, 417–20.

Two cases resembling leprosy are described. The first was a patient who had been in contact with leprosy, but showed a skin condition resembling granuloma annulare on the backs of the hands. There were no sensory changes and no lepra bacilli were found. The histological appearance was that of granuloma annulare. The authors however did not accept that diagnosis but found it a case of leprosy, as the Mitsuda reaction was very strongly positive, and the condition cleared up entirely in a few weeks on treatment with Pasiniazide.

The second patient was at first diagnosed as having leprous panniculitis. But later the diagnosis was changed to Pfeiffer-Weber-Christian disease for various reasons: it was not exacerbated by sulphones, the fever was less than in lepra reaction, the Middlebrook-Dubos reaction was negative though it is almost always positive in lepra reaction, the lesions were bacteriologically negative. The authors insist that in a country where leprosy is endemic very careful examinations should be repeated before a diagnosis of leprosy is made, because of the serious family and social consequences of a mal-diagnosis.

Ernest Muir

BROWNE, S. G. **A Hypermelanotic Rash complicating Sulphone Therapy.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, Nov., v. 53, No. 6, 495–505, 6 figs. (4 coloured) on 2 pls. [41 refs.]

The author describes a condition, which appears to be confined to the Bantu race, in which areas of skin become hyperpigmented. Out of a population of 45,035 persons in the Belgian Congo, and out of 5,349 of these under sulphone treatment for leprosy, there were 160 cases of hypermelanotic macules. It made little or no difference which form of sulphone treatment was used. The hyperpigmentation was circumscribed and macular in 145 patients, and diffuse in the others. The macules occurred in 69 patients in the scapular region, and in 66 on the arms: the distribution on all sites is tabulated. The rash sometimes appeared after only a short period of treatment, sometimes later. Sometimes there was intense irritation, and scratching led to other complicating skin lesions. There was no sign of a familial tendency; the form of

leprosy for which the patient was under treatment made no difference; there was no relationship between the sites of leprosy lesions and the hyperpigmented macules.

Biopsies showed that the skin pigment was melanin.

It was suggested that the cause was "a disturbance in the functional activity of the melanoblasts" though there was no suggestion of the nature of this disturbance. The changes "are consistent with a direct toxic action on areas of sensitive melanoblasts by diaminodiphenyl sulphone, with alteration of the mechanism of melanin formation or storage or transport". *Ernest Muir*

DINIZ, O. & FONTE, J. Importância do contrôle sistemático das comunidades militares para o descobrimento precoce dos casos de lepra. [**The Importance of Systematic Military Assistance in the Early Discovery of Cases of Leprosy**] *Bol. Serviço Nac. de Lepra.* Rio de Janeiro. 1959, Dec., v. 18, No. 4, 302–9.

The authors mention 4 fundamental means of leprosy control: early diagnosis, mass treatment, health education, and prevention of exposure to infection. These can be accomplished by the following steps. (1) Notification of patients: this fails frequently from omission of notification or because the authorities take no action; thus only about 25% of patients are registered. (2) Epidemiological census so as to find out the actual amount of leprosy and where the chief foci exist. (3) Control of contacts: enquiries showed that among people living in contact with leprosy there were 39·8 per thousand cases of leprosy found, while among those not in contact there were only 2·8 per thousand. (4) Periodic examinations of selected areas of the population: an analysis of 33,198 patients registered in Brazil showed that signs of leprosy appeared in 70% under the age of 30, evidence that the disease shows itself most in the most productive period of life. Out of 27,898 patients 62·8% were male and 37·2% female.

It is suggested that in the campaign against leprosy the help of the medical services of the armed forces should be sought. *Ernest Muir*

HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*TREMATODES (*schistosomes, other flukes*); CESTODES (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); NEMATODES (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

MATTES, O. & WIGAND, R. **Helminthen und Helminthiasen des Menschen.** [Helminths and Helminthiasis of Man.]

This book was reviewed on p. 320.

GLASS, J. **A Clinical Trial of a New Anthelmintic—Dilombrin (Pfizer) Brand of Dithiazanine.** *J. Roy. Nav. Med. Serv.* 1959, v. 45, No. 3, 126–31.

The author reports the results of a clinical trial of Dilombrin, provided in doses of 100 mgm. in gelatin capsules. 50 patients (Indian, Chinese, Malayan,

Pakistani and Eurasian) were studied in the Royal Naval Asian Hospital, Singapore. The following nematode infections were present: ascariasis (44), trichuriasis (28), ankylostomiasis (12). Dosages ranged from a total of 1·8 gm. to 7·5 gm.; the regimen from 200 mgm., three times daily for 3 days (2 cases with mixed *Ascaris* and *Trichuris* infection) to 200 mgm., three times daily for 5 days followed by 300 mgm., three times daily for 5 days (one case infected with all three worms).

Ascaris infection responded well to total dosage regimes of more than 3·0 gm.; *Trichuris* infection to regimes of more than 2·8 gm. Hookworm infection did not respond, except in one case (total dosage 5·6 gm.). An incidental finding was the clearance of *Trichomonas* infection. Side effects, including nausea, vomiting, diarrhoea and giddiness, were present in some degree in about one-third of patients. Tolerance appeared to improve the larger the daily or total dose given. *B. G. Maegraith*

Do Amaral, A. D. Sôbre o emprêgo do iodeto de ditiazanina como anti-helmíntico. **[The Use of Dithiazanine Iodide as an Anthelmintic]** *Brasil-Médico.* 1959, Aug. 1–29, v. 73, Nos. 31/35, 15–23. [15 refs.] English summary.

A general review and discussion.

Barbosa, F. S., Barbosa, I. & Morais Rêgo, A. **Laboratory Infection of the Snail** *Planorbarius metidjensis* **(Forbes) from French Morocco with a Brazilian Strain of** *Schistosoma mansoni.* *Ann. Trop. Med. & Parasit.* 1959, Sept., v. 53, No. 3, 314–15.

The authors, in Brazil, obtained a collection of *Planorbarius metidjensis* from Rabat, French Morocco, and exposed each of 12 such snails to 20 miracidia of a Brazilian strain of *Schistosoma mansoni* at a water temperature of 25°–27°C. The snails were examined daily for cercariae. The mortality was high; only one snail survived longer than 28 days and thereafter it shed cercariae. A white mouse was infected with these cercariae and mature female *S. mansoni* were recovered from its liver 46 days after exposure.

Snail sections were made 48 to 72 hours after exposure of 3 other *P. metidjensis* which had been infected with large numbers of miracidia. Sections from the anterior part of the snails showed that although many miracidia had penetrated, only a few were able to develop without any host reaction. The areas of cellular reactions found in all were similar to those seen in snails partly or wholly resistant to *S. mansoni*: presumably the reactions were occurring around unrecognized miracidia.

S. mansoni infections are unknown in North Africa apart from Egypt, but potential intermediate hosts have been found in several regions where the disease has not become established, for example, in the Southern United States [this *Bulletin*, 1945, v. 42, 646], Chile [*ibid.*, 1958, v. 55, 908] and Ecuador [*ibid.*, 1959, v. 56, (634)]: in the last two the snails were capable of supporting development of larval stages of Brazilian strains of *S. mansoni*. The present study shows that *P. metidjensis* is a potential vector of *S. mansoni* in French Morocco. This is the first time that this snail from Africa has been infected

successfully with *S. mansoni*. SCHWETZ *et al.* [*ibid.*, 1956, v. 53, 72] showed that *P. dufouri* from Portugal could be infected with an African strain of *S. mansoni* and this snail is considered to be the same species as *P. metidjensis* from North Africa. It is noted that *S. mansoni* and *S. haematobium* can develop in the same or related intermediate hosts and it is believed that *P. dufouri* is the vector of *S. haematobium* in South Portugal—the only member of the Planorbinae to be incriminated as a transmitter of urinary schistosomiasis.

Little work has been published on the host-parasite relationships of Portuguese *S. haematobium* and molluscs from other geographical areas and it is very important that more should be known on the schistosome-vector complex in southern Portugal, Africa and the Americas. *H. J. O'D. Burke-Gaffney*

ROSENBERG, E. & BLACK, H. **The Value of Biopsy of Cores of Fresh Hepatic Tissue in the Diagnosis of Schistosomiasis.** *Amer. J. Clin. Path.* 1959, Nov., v. 32, No. 5, 472–3, 1 fig.

Although stained specimens of liver biopsies are well known to be useful in the histological study of schistosomiasis, any ova seen in them are usually fragmented and distorted. The authors, from the Veterans Administration Hospital, Bronx, New York, use a Menghini needle with which cores of tissues 25 × 1·9 mm. may be extracted; these are large enough to allow half to be retained for examination in the fresh state, the other half being sent for histological examination.

The fresh specimen is placed in a drop of saline or glycerol (with the latter a semi-permanent mount may be made) and compressed between a slide and a cover-slip. Any schistosome ova present are readily identified and their morphology clearly defined (this is illustrated in a photomicrograph).

In the first 3 biopsy specimens thus examined from patients with ova in the stools, 2 to 3 ova were found in each of the 3 biopsies; in the portions sectioned and stained only 1 ovum was found altogether, although granulomatous changes were present. The authors point out that this method was described by YOSHIZUMI in 1954 [this *Bulletin*, 1955, v. 52, 662; 1956, v. 53, 617]. In those studies ova were found in liver biopsies in 8 of 10 patients with negative stools, and later in 60% of 113 patients.

The present authors confirm that this simple technique is of greater value in the diagnosis of hepatic schistosomiasis than is examination of fixed and sectioned specimens. *H. J. O'D. Burke-Gaffney*

CARTER, R. A. & SHALDON, S. **The Liver in Schistosomiasis.** *Lancet.* 1959, Dec. 5, 1003–8, 7 figs. [18 refs.]

After brief reference to the literature on the subject the authors record their findings in 36 young Nigerian soldiers with clinically mild schistosomiasis (24 *Schistosoma haematobium*; 12 *S. mansoni*; and 2 both infections). The majority of these men had previously been treated for their infections. In 7 instances the liver was palpable, and in 3 of these the spleen was also palpable. Liver biopsies were done through the mid-axillary line with a Vim-Silverman needle; serial sections were cut of the material obtained; 11 of the liver specimens

(8 *S. haematobium* and 3 *S. mansoni*) were considered to be histologically normal. In 5 *S. haematobium* and 3 *S. mansoni* cases eggs surrounded by granulomata were found; in another 4 *S. mansoni* cases eggs were seen unattended by reaction. In 7 other instances old granulomata were seen without contained eggs. Other changes noted were portal tract infiltration severe (12 cases) or slight (13 cases), fibrosis conspicuous (5 cases) or slight (9 cases), and "hepatitis"—an inflammatory infiltration of the parenchyma with an associated portal tract infiltration (5 cases). All these are illustrated by photomicrographs. Rectal biopsies also were done; it was noted that *S. mansoni* eggs provoked a greater reaction in the rectal mucosa than did those of *S. haematobium*, though the latter were found in greater numbers in this site.

The authors conclude that schistosomal involvement of the liver takes two forms. One is granuloma formation which is excited by the eggs acting as foreign bodies. The other is a hepatitis which progresses to a diffuse fibrosis; this is not caused by the eggs and is independent of them; nevertheless, in the absence of evidence to the contrary, it presumably is attributable to the schistosomal infection. *A. R. D. Adams*

FRIEDHEIM, E. A. H. & DE JONGH, R. T. **The Effect of a Single Dose of TWSb in Urinary Bilharziasis: Suggestions for a Suppressive Management of Bilharziasis.** *Ann. Trop. Med. & Parasit.* 1959, Sept., v. 53, No. 3, 316–24. [10 refs.]

Several workers have reported that this drug (antimony-a,a′-dimercaptosuccinate) is curative in all forms of human schistosomiasis [this *Bulletin*, 1957, v. 54, 971; 1958, v. 55, 181, 664, 665]. The authors have given a single dose of 0·4 or 0·5 gm. intramuscularly (7 to 37 mgm./kgm.) to 20 patients, some of them children, passing *Schistosoma haematobium* eggs in the urine. The numbers of eggs excreted both before the treatment and for periods up to 313 days subsequently have been studied. The method of estimating the number of eggs in a sample of urine was to take 40 ml., spin this at 2,500 r.p.m. for 10 minutes, and examine the deposit. To determine their viability the sediment was suspended in 15 ml. of water and again spun at 3,500 r.p.m.; this promoted rapid or "forced" hatching of viable miracidia, usually within 15 minutes.

The dosage was well tolerated by adults. Within 4 or 5 days of the injection sluggish miracidia emerged from those eggs which hatched; dead or immobile miracidia were evident in the remainder, and the proportion of these increased to 100% over a period of 2 weeks as normally hatching active miracidia progressively disappeared. The symptoms (dysuria and haematuria) concurrently lessened. Viable ova did not reappear in the urines of these patients until 1 to 5 months after treatment; the usual period was about a month. This suggests that a monthly single dose treatment would both render the patients non-infective to the snail vectors, and relieve them of the usual symptoms of the disease.

A single dose treatment at 6- to 12-week intervals would probably suffice to achieve this result in 95% of cases, if the dose were 0·5 or 0·6 gm. The danger of drug resistance is probably negligible. The drug temporarily affects the ovaries of the fluke; possibly only a few subsequently regain their full normal

function. In view of the rapidity of action on the ova passed in the urine the question arises as to whether the drug affects also the ova already extruded by the worms; this is highly improbable as suspension of normal eggs in a solution of 1 in 1,000 TWSb for 3 hours at 30°C., or in the urine of normal persons treated with a dose of TWSb, did not affect them. It therefore is probable that eggs passed by the worms escape into the urine within a much shorter time than has been estimated by some workers, and that the period is less than one week. *A. R. D. Adams*

SALITERNIK, Z. & WITENBERG, G. **Investigations on the Control of Bilharziasis Vectors in Israel.** *Bull. World Health Organization.* Geneva. 1959, v. 21, No. 2, 161–77, 3 figs.

During the first decade of Israel's autonomy not less than 12,000 immigrants excreting schistosome ova are estimated to have entered the country, about 74% being carriers of *Schistosoma mansoni* and 26% of *S. haematobium*, yet only one small epidemic caused by each species occurred during that time [see, for example, this *Bulletin*, 1953, v. 50, 1154]. *Bulinus truncatus* has been reported in many local foci but only 1 focus of *Biomphalaria alexandrina* was found and it later disappeared. The conditions suitable for breeding *B. truncatus* are described. Transmission was limited because strains of *S. haematobium* from Iraq and Morocco proved incompatible for the local vector, and there was little contact between man and snail-infested water, the only groups at risk being schoolchildren and fish-pond workers.

Laboratory experiments on molluscicides showed that sodium pentachlorophenate and copper sulphate were satisfactory against snail ova, adult snails and cercariae. A number of other chemicals proved either ineffective or too expensive. Cercariae in water containing organic matter were killed by chlorine when the dose was adjusted to leave 0·4 to 0·6 part per million after 10 minutes' contact.

A new form of trap is described, which was used to detect snails present only in small numbers. The presence of vegetation encouraged breeding and the introduction of the water hyacinth in 1953 greatly increased snail populations. Herbicides were only partly successful and complete control required mechanical and manual removal. Sodium pentachlorophenate and copper sulphate were applied as solutions or powders, or the former was applied as briquettes. Chemical and organic content of the water and vegetation altered the effectiveness of chemical control, and copper sulphate results varied without any satisfactory explanation. Both chemicals were more effective in lower concentrations for a longer period than in stronger dosage for a shorter period. Pentachlorophenate was generally more satisfactory but was more toxic to fish, more expensive, and was irritant to persons applying it. Both were most effective in powder form and in stagnant water, and were best applied when the water was high and the whole stream system was treated. A combination of control methods often proved effective.

The final section discusses preventive measures suitable for Israel and recommendations are made for reducing and ultimately eliminating the disease, at any rate in limited areas. *T. H. Davey*

PERLOWAGORA-SZUMLEWICZ, Alina. **Studies on the Biology of** *Australorbis glabratus,* **Schistosome-Bearing Brazilian Snail.** *Rev. Brasileira Malariologia.* Rio de Janeiro. 1958, Oct., v. 10, No. 4, 459–529, 14 figs. [30 refs.]

The lack of basic biological information concerning the snail intermediate hosts of schistosomes has prompted Perlowagora-Szumlewicz to carry out an extensive investigation on *Australorbis glabratus* from Brazil. The experiments were designed to investigate the length of life cycle and the fecundity of the snails and the factors affecting these features. Two strains of the same species of snail were used and the experiments extended over 3½ years.

Some of the more important observations reported in this very useful paper are as follows. Size was a more significant factor in the onset of sexual maturity than age. The pre-oviposition period varied from 26·9 to 82·7 days with a mean of 44 days. The average length of the life cycle was 53 days. The incubation period of the eggs varied considerably with the external temperature; initial hatching began in about 7 days in the summer but in the cool season the period was about 15 days. The number of eggs per egg-mass increased gradually during the first 3 months of maturity and the mean number finally reached was about 19 in one population and about 25 in the other. The fecundity of the snails was highest in the first few months after reaching sexual maturity and then gradually declined; the maximum length of active reproductive life was about 18 months. Reproductive activity was strongly enhanced by the presence of vegetation. The maximum population density built up by an isolated snail was 100 individuals at the end of 2 months, over 400 after 4 months and nearly 700 after 6 months. Maximum size is reached at about 14–17 months of age. Mortality rates were highest in the young snails. Isolated snails had a slightly longer pre-oviposition period than those which were paired but the isolated individuals grew faster, attained a greater maximum size and showed a higher reproductive activity; also there was no difference in the viability of their eggs when compared with those laid by paired snails.

C. A. Wright

FERGUSON, F. F. & PALMER, J. R. **Biological Notes on** *Marisa cornuarietis,* **a Predator of** *Australorbis glabratus,* **the Snail Intermediate Host of Schistosomiasis in Puerto Rico.** *Amer. J. Trop. Med. & Hyg.* 1958, Nov., v. 7, No. 6, 640–42.

"The omnivorous and voracious habits of the large ampullarid snail *Marisa cornuarietis* are the basis of its predation and competitive action against *Australorbis glabratus* in Puerto Rico. Field observations have been made on the biology of *Marisa* in comparison with that of the schistosome vectorial species."

DE JESUS, J. A. & HERNANDEZ-MORALES, F. Estudio comparativo entre el examen de las heces fecales, biopsia rectal y aspecto sigmoidoscópico en el diagnóstico de la esquistosomiasis de Manson. [**Comparative Study between Faecal Examination, Rectal Biopsy and Sigmoidoscopic Appearance in the Diagnosis of** *Schistosoma mansoni* **Infections**] *G.E.N.* Caracas. 1959, Jan.–June, v. 13, Nos. 3/4, 119–20.

Because of differences of opinion on the relative efficacy of faecal examination and rectal biopsy in the diagnosis of *Schistosoma mansoni* infections,

the authors, from Puerto Rico, made a study of these methods and also attempted to find out whether the presence of ova could be determined with accuracy from the appearance of the rectal mucosa.

They obtained the case histories of 1,000 consecutive rectal biopsies and compared the findings with those of faecal examination and sigmoidoscopy.

The biopsies had been made for the following reasons: (i) past history of schistosomiasis, (ii) residence in an endemic area, (iii) unexplained gastro-intestinal symptoms, (iv) presence of hepatic dysfunction, enlarged spleen or liver or a combination of all three, (v) haemorrhoids submitted to routine sigmoidoscopy, with appearances in the mucosa suggesting schistosomiasis.

In all the 1,000 patients, *S. mansoni* ova were found only in 410.

The sigmoidoscopic examination was suggestive in 383 patients and 210 were positive for ova; in 580 it was negative and ova were present in 175; and in 37 it was not made, but ova were found in 25. In the whole 410 in whom ova were found, 341 were positive by biopsy and 247 out of 398 examined were positive by faecal examination. The biopsy was positive but the faeces negative in 149, but the opposite result was found in only 67. There were only 2 cases in which ova were found in stained biopsy specimens where fresh preparations had been negative. Rectal granulomata were discovered in only 4 patients.

The authors conclude that (i) the presence or absence of ova cannot be determined by the appearance of the rectal mucosa, (ii) rectal biopsy is superior to examination of faeces, but both should be used together, (iii) a fresh biopsy specimen is adequate for diagnosis. *H. J. O'D. Burke-Gaffney*

CAVALCANTI, J. S. & MEMEZES, H. Um caso di fibroma do mediastino com pseudo-tuberculos esquistossomoticos. [**Mediastinal Fibroma with Schistosomal Granuloma**] *Rev. Assoc. Med. Brasileira.* 1956, Sept., v. 2, No. 4, 336–40, 9 figs. [12 refs.] English summary (4 lines).

ABDALLA, P. & QUEIROZ, B. Esplenoportografia. [**Splenoportography**] *Bol. Centro Estudos Hosp. Servidores Estado.* Rio de Janeiro. 1959, Sept., v. 11, No. 9, 424–54, 30 figs. [45 refs.]

The English summary appended to the paper is as follows:—

"The authors present an article on trans-cutaneous splenoportography based on 100 cases of cirrhosis, schistosomiasis, congenital malformations, abdominal tumours, control of portacaval anastomosis, traumatic thrombosis and Cruveilhier-Baumgarten's syndromes.

"After a short introduction the technique they employ in accordance with Campi and Abeatici's is described.

"They use local anesthesia and take only one X-ray plate.

"They study, in the next step, the complications and declare that they have had as yet no serious complication. They analyse their own material which is the basis of all their considerations.

"At last, they treat the problem of interpretation of the X-ray pictures, chiefly in cirrhosis and schistosomiasis, which is the most important part of their work. They believe that the appearance of the amputation of the hilar

branches of the portal vein, just as may be seen in schistosomiasis, may be the radiographic equivalent of thrombosis of the intra-hepatic vessels, and they present arguments to justify their point of view."

LIMA GOMEZ, O., WUANI, H. & ZAIDMAN, I. Consideraciones clínicas sobre la bilharziosis mansoni hepato-esplénica. **[Clinical Aspects of Hepato-Splenic *Schistosoma mansoni* Infection]** *G.E.N.* Caracas. 1959, Jan.–June, v. 13, Nos. 3/4, 223–34.

This is a detailed report on the clinical signs and symptoms and a number of laboratory findings detected in 50 cases of *Schistosoma mansoni* infection seen at Caracas. In addition to examination of the faeces, both rectal and liver biopsy were used in diagnosis. 33 patients were male and 17 female.

23 patients had an associated intestinal parasitic infection which in 9 cases was due to *Necator*. 23 persons sought medical advice for haematemesis, and radiological evidence of oesophageal varices was obtained in 34 of 40 patients examined. 45 had oedema of the lower limbs and 15 free ascites. All 50 had enlargement of the spleen, which in all but 4 was marked, and in 28 there was hepatic enlargement also. Here examination either by biopsy or at autopsy showed portal fibrosis in 8 and 9 with portal cirrhosis. Preoperative splenoportography was performed in 21 patients, the principal findings being: (a) considerable development of the collateral network of veins; (b) dilatation and kinking of the splenic vein; (c) increased diameter and straightening of the portal vein; (d) decreased intrahepatic circulation.

Examination of the blood and its components showed anaemia, usually of moderate grade [though no less than 19 patients had a red cell count of 3 million per cmm. or less], leucopenia, Hb less than 12 gm. in 45, eosinophilia over 4% in 33 patients, thrombocytopenia under 200,000 in 39 out of 47 patients examined, and plasma prothrombin activity 80% or less in 36 out of 49.

In discussion the authors point out the rarity of the classical signs of hepatic insufficiency and also that many of the laboratory tests of liver function were normal or only slightly altered. They consider the most important findings to be:—enlargement and increased consistency of the liver; the frequency of oedema of the lower limbs and ascites; hypoprothrombinaemia; a true hypersplenic syndrome which has a deleterious effect on the bone marrow. The fundamental lesion in the liver is intrahepatic fibrosis with relative indemnity of the liver cells and this explains the peculiar clinical evolution.

W. K. Dunscombe

DEWITT, W. B. & WARREN, K. S. **Hepato-Splenic Schistosomiasis in Mice.** *Amer. J. Trop. Med. & Hyg.* 1959, July, v. 8, No. 4, 440–46, 2 figs. [19 refs.]

Of the two clinical syndromes occurring in human infections with *Schistosoma mansoni* hepato-splenic schistosomiasis is less frequent but more serious than the intestinal form. It is insidious in onset, progressive, and when advanced, provokes enlargement of the liver and spleen, ascites, anaemia, and oesophageal varices which are the most frequent specific cause of death.

The uncertain pathogenesis of this syndrome has been attributed to (a) localized granulomatous lesions in the liver due to eggs, (b) portal cirrhosis provoked by toxic products from adult worms, (c) a response to dead adult worms in the liver, and (d) malnutrition.

Though the complete syndrome has not previously been knowingly produced in experimental animals, the authors have produced portal hypertension and oesophageal varices in mice by infection with *S. mansoni* [this *Bulletin*, 1959, v. 56, 635].

In the present study 450 mice were exposed to *S. mansoni* cercariae and examined by autopsy at 2-week intervals from the 6th to the 16th week.

The liver became enlarged by the 8th week after infection, and enlargement of the spleen, ascites, oesophageal varices and anaemia followed 2 weeks later. Despite these changes, liver function tests were hardly disturbed. In such mice, since normal albumin blood levels were maintained, the synthesis ability of the liver parenchyma was not damaged, but there was a progressive increase in the beta and gamma globulins, which suggests a disturbance of reticulo-endothelial system.

The development of these manifestations in the different stages of the developing infections is correlated to some extent with the numbers of worms, the number and concentration of eggs in the liver, and the authors suggest that the syndrome is due predominantly to the penetration of the portal canals of the liver by large numbers of schistosome eggs with subsequent formation of granulomata; the subsequent obstruction of portal blood flow resulted in portal hypertension and the other manifestations described. *W. E. Kershaw*

CHU, Chiao-Chen, LIANG, Yu-I, TAO, Zheng-Qin & TING, Kuang-Sheng. [**Studies on Antischistosomal Drugs. XXI. Toxicity and Therapeutic Activity of Sb-58, Sb-126 and TWSb and the Distribution and Excretion of Antimony after Administration of these Compounds**] *Acta Pharmaceutica Sinica*. 1959, Nov., v. 7, No. 8, 320–26. [15 refs.] [In Chinese.]

The English summary appended to the paper is as follows:—

"Dogs received intramuscularly 6 injections each of Sb-58, Sb-126 and TWSb. They caused slight irritation locally, but exerted little influence on blood sugar and electrocardiogram. Food intake decreased in all, more pronounced with TWSb, which produced a damage to heart and liver more seriously than the other 2 drugs.

"Dogs, previously infected with Schistosoma japonicum, were treated i.m. with Sb-58, Sb-126 and TWSb. The dosages were respectively 6, 3 and 6 mg./kg b.i.d. for 3 days. The blood Sb concentrations ½ hour after the last injection were 5·0, 4·1 and 6·5 μg/5 ml respectively, and all dropped to about 2 μg after 24 hours. The dogs were killed after a holding period of 13 days, and the average numbers of worms remaining in each dog were found to be 60, 16 and 67 respectively. Sb-126 caused the highest degree of degeneration of the helminths and a complete cure of 1 dog. Hence, the therapeutic activity of Sb-126 was deemed to be slightly higher.

"Infected rabbits were given i.m. 1 injection each of the 3 antimonials at an equivalent dosage of 2·92 Sb mg/kg. The blood Sb level ½ hour later was lowest for Sb-126 (5 μg/5 ml) and highest for TWSb (21 μg/5 ml). After 24

hours, the blood Sb levels all lowered to about 1 μg. No marked difference among the 3 drugs with respect to the Sb concentrations was observed in liver, kidney, spleen and schistosomes. The urinary excretion of Sb in 24 hours was greatest for TWSb (40%) and least for Sb-126 (25%). It was believed that the slower excretion of Sb-126 was partly responsible for its higher therapeutic efficacy."

WANG, Shao-Hsun & LIU, Keng-Nien. **Present Status of Roentgenology in the Diagnosis of Paragonimiasis.** *Chinese Med. J.* Peking. 1959, Nov., v. 79, No. 5, 446–55, 7 figs. on 5 pls. [15 refs.]

There are four stages of the X-ray appearance of paragonimiasis of the lung. The lesions occur mostly in the middle and lower lung fields. The active stage is infiltrative and shows as cloudy shadows with blurred outlines, sometimes containing fluid when abscess is present. These shadows regress or progress to the next stage, depending on the course of the disease. As the lesion develops the nodular or cyst stage appears, characterized by sharp nodular shadows about 1 cm. in diameter, in the centre of which are a few "bubble-like" transparent areas. These shadows may persist or become multilocular or ring-like. Such appearances arise from increasing density of the fibrous tissue surrounding the cystic wall or from evacuation of contents of a cyst into a bronchus. This is the chronic stage and may be followed by healing fibrosis with mottled streaky shadows, or by calcification. Of 526 patients, 43 showed some calcification; 10 developed calcification during treatment within a year of first examination. Pleural adhesions are fine and difficult to see. Effusion occurs in less than 1% of cases. Enlargement of the hilar glands is rare.

Extensive scarring may result from the invasion of the peritoneal cavity by the migrating worm. The presence of dense adhesions may thus be demonstrated in some patients. Occasionally the reaction about aberrant worms may lead to tumour formation and displacement of viscera.

Lesions of the central nervous system are common in paragonimiasis. The worm enters the temporal and occipital lobes of the cerebrum where it causes either space-occupying abscesses ("expansile" lesions) or atrophic lesions. These are usually unilateral. The expansile reactions are indicated in X-ray by signs of increased intracranial pressure. Calcified foci are not uncommon; these are often several cm. in diameter and are visible on ordinary skull X-ray examination. Encephalograms and ventriculograms are useful in diagnosis; angiography is not helpful.

The very rare involvement of the spinal cord arises from active penetration of the worm rather than by blood dissemination and may be identified as an epidural lesion. Myelography is helpful for ascertaining the level.

B. G. Maegraith

OKABE, K. & OBA, N. **On the Helminthic Parasites of Cats in the Southern Part of Fukuoka Prefecture.** *Kurume Med. J.* 1959, v. 6, No. 1, 36–7.

In early 1957 the authors, from Kurume University School of Medicine, Japan, made a study at autopsy of helminthic parasites of 52 cats captured in 4 areas of the Fukuoka Prefecture and one area in the Kumamoto Prefecture. 46 of the cats were infected with 8 species of helminths, as shown in the following table.

Number of cats examined	52	%
Number of infested cats	46	88·4
Clonorchis sinensis	7	13·4
Taenia taeniaeformis	15	28·8
Dipylidium caninum	6	11·5
Diphyllobothrium mansoni	15	28·8
Ancylostoma caninum	5	9·6
Toxocara cati	24	46·1
Dirofilaria immitis	3	5·7
Metagonimus yokogawai	8	15·3

The authors believe that cats play a large role as reservoir hosts of *Clonorchis sinensis* in parts of the area. It is also suggested that the high infection rate of cats with *Metagonimus yokogawai*, notably in the Yanagawa District, would cause them to be a source of infection for the local population. People in this district should be warned of the possibility of these infections.

H. J. O'D. Burke-Gaffney

CORDERO, R. & KOPPISCH, E. Segundo caso de cisticercosis intracraneana en Puerto Rico; operación y curso postoperatorio. [**Second Case of Intracranial Cysticercosis in Puerto Rico**] *Bol. Asoc. Med. de Puerto Rico.* 1959, Nov., v. 51, No. 11, 403–14, 8 figs. [12 refs.]

[See this *Bulletin*, 1954, v. 51, 1272.]

THIENPONT, D., DE KEYSER, J., VANDERVELDEN, M. & KAGERUKA, P. La cysticercose cérébrale du porc. [**Cerebral Cysticercosis in Pigs**] *Ann. Soc. Belge de Méd. Trop.* 1959, Aug. 31, v. 39, No. 4, 507–14.

The English summary appended to the paper is as follows:—

"The authors describe cysticercosis of the brain in pigs of Ruanda-Urundi. Out of 100 pigs with cysticerci in the muscles 68 had larvae of *Taenia solium* in the brain, the number of larvae varying from 1 to 86.

"The cysticerci were found in all parts of the brain or meninges. In rare cases, only the brain is infested so that from the point of view of meat inspection this organ should be carefully examined both on the surface and after incising it. Only the ordinary vesicular form was found and never the *Cysticercus racemosus* form such as is found in human beings.

"Histological examination showed a capsule of granulation tissue made up of 2 or 3 layers infiltrated with lymphocytes, plasma cells, and eosinophils."

JIMÉNEZ-QUIRÓS, O. Difentano-70: Tratamiento electivo en himenolepiasis nana. [**Diphenthane-70, the Treatment of Choice for *Hymenolepis nana* Infections**] *Rev. Biologia Trop.* San José, Costa Rica. 1959, July, v. 7, No. 1, 75–80. [10 refs.] English summary.

The author used Diphenthane-70 in the treatment of *Hymenolepis nana* infections in 20 freshmen of the University of Costa Rica [see below, p. 420].

Two tablets of 0·5 gm. each were given 3 times daily for 5 days and this cycle was repeated on 2 more occasions with 10-day intervals between each, so that the total dosage was 90 tablets (45 gm.) in 35 days. Stools were examined 3 times from the third week after the last course, at intervals of 15 days.

The results are shown in 2 tables. The first table indicates that all stools were negative at the first post-treatment examination, 19 at the second and 18 at the third. Tolerance was good and although 8 patients showed mild intestinal side effects (listed in the second table) it was not necessary to interrupt treatment. *H. J. O'D. Burke-Gaffney*

MAZZOTTI, L., GARZA DE LOS SANTOS, Alicia & DIAZ MUNOZ, A. Tratamiento de la infección por *Hymenolepis nana* con el compuesto Ro 2-5655/3. [**Treatment of** *Hymenolepis nana* **Infection with Ro 2-5655/3**] *Medicina.* Mexico. 1958, July 10, v. 38, No. 799, 289–91.

This preparation, having the formula (m-allyloxyphenylcarbamylmethyl) dipropyl (p-chlorobenzyl) ammonium chloride monohydrate has been used in the treatment of enterobiasis [this *Bulletin*, 1956, v. 53, 1259 *bis*] and in laboratory experiments with *Hymenolepis fraterna*. The present authors, in Mexico, have used it in the treatment of 31 patients infected with *H. nana*. Initially the dosage used was 40 mgm./kgm. daily for 3 days, but as colic and diarrhoea occurred in some adults, the daily dose was reduced to 20 mgm./kgm. for patients weighing more than 40 kgm. The ages of the patients varied from 2 to 43 years, the weights from 10 to 80 kgm. and the total doses from 1,200 to 5,400 mgm. Stools were examined by direct and concentration methods before and on 1 to 4 occasions after treatment at periods varying from 5 to 55 days.

The results are shown in a table: 7 patients were positive for *H. nana* eggs at various examinations (2 at the first, 4 at the second and 1 at the third). Of the 24 patients considered cured, 17 had only 1 post-treatment examination for ova. The significance of repeated examinations is discussed. In only 6 patients could egg counts be undertaken and these showed elimination of ova in the 4 who were cured.

The authors note that these results compare favourably with those obtained with the use of acridines [*ibid.*, 1954, v. 51, 293], but on recommending the new drug they draw the attention of doctors to the need to be on the lookout for possible side effects. *H. J. O'D. Burke-Gaffney*

KNIERIM, Feliza. Evaluación de la sensibilidad y especificidad de la reacción de fijación del complemento para la hidatidosis. [**Assessment of Sensitivity and Specificity of the Complement-Fixation Test for Hydatid Disease**] *Bol. Chileno de Parasit.* 1959, Oct.–Dec., v. 14, No. 4, 75–9. [12 refs.]

The English summary appended to the paper is as follows:—

"The 50% end point hemolysis technique for the complement fixation test for hydatid disease was performed in sera specimens of 122 individuals with hydatid disease. The serological reaction was positive only in 61% of these confirmed cases. Sensibility of the reaction was in relation to localization of the cyst and age of the patients.

"In order to study the specificity of the complement fixation test, it was also performed in cases of trichinosis, distomatosis, and hepatic amebic abscess.

Five of the twenty cases of distomatosis gave cross reactions. The sera of the trichinosis and hepatic abscess patients gave negative results.

"In 130 sera specimens of individuals suffering from non-parasitic diseases we obtained 5 false positive reactions, 4 of which corresponded to cases of cancer and one to a case of chronic cholecystitis."

MIYAGAWA, T., YAMADA, A., IGAKI, A. & MORISHITA, T. Röntgenologische Studien über den *Echinococcus cysticus pulmonum*. [**X-Ray Studies of** *Echinococcus* **Cysts of the Lung**] *Yokohama Med. Bull.* 1959, Aug., v. 10, No. 4, 206–27, 7 figs.

CALDERÓN, E. Hidatidosis subcutánea—Ruptura espontánea de un quiste lumbar izquierdo. [**Subcutaneous Hydatid Cyst. Spontaneous Rupture of a Lumbar Cyst**] *Bol. Chileno de Parasit.* 1959, Oct.–Dec., v. 14, No. 4, 85–7. [11 refs.] English summary (7 lines).

DICK, E. T. **Hydatid Cyst of the Spleen.** *New Zealand Med. J.* 1959, Oct., v. 58, No. 327, 629–32, 3 figs. on 2 pls.

A case in New Zealand.

ABDALLAH, A. **Epidemiology of Ankylostomiasis in Egypt.** *J. Ministry of Health.* Cairo. 1959, Oct., v. 1, No. 2, 4–12.

This is a brief and interesting general account of the history and incidence of ankylostomiasis in Egypt, and of the factors influencing its acquirement. The author considers the lack of suitable latrines to be the principal factor helping the spread of infection, while he believes the problem of bare feet to be of the "utmost importance" in influencing the acquirement of infection; and he writes "In our country, the skin of the foot is almost exclusively the route of infection". In support of this statement he advances an interesting explanation for the difference in the infection rates noted between two villages only two kilometres apart. In one village during the period 1954–58 the percentage of persons found infected at the five annual inspections varied between 0·6 and 2·8, whereas in the neighbouring village it varied between 11·9 and 31·5. Looking for a cause for this striking difference he observed that the inhabitants of the village with the low infection rates "wear a special and very cheap kind of foot-wear which is made locally in the village from old rubber tyres".

It is noted that the percentage of infection, in general, is decreasing, mostly as the result of mass treatment during the past 30 years, and of the erection of some 40,000 latrines in some of the provinces during the past 10 years. Figures are given for surveys in different areas. *R. M. Gordon*

JIMÉNEZ-QUIRÓS, O. Ascariasis con manifestaciones nerviosas y eosinofilia del *liquor*. [**Ascariasis with Nervous Manifestations and Eosinophilia in the Cerebrospinal Fluid**] *Rev. Biologia Trop.* San José, Costa Rica. 1959, July, v. 7, No. 1, 67–74. [15 refs.] English summary.

Report of a case.

SOUTH PACIFIC COMMISSION. Noumea, New Caledonia. **A Review of the Literature on the Distribution and Epidemiology of Filariasis in the South Pacific Region** [IYENGAR, M. O. T.]. *Technical Paper No. 126.* 1959, Oct., 172 mimeographed pp., 1 map. [6s.]

In this publication, Dr. Iyengar has brought together 311 abstracts of the literature relating to the distribution and epidemiology of filariasis in the South Pacific Region. The references appear in chronological order, from the notes of Captain Cook in 1785 to recent work in 1959. This arrangement facilitates an understanding of progress and development in knowledge of the subject. Most of the abstracts were made from the original sources.

There is an alphabetical list of authors, with the date of publication shown in brackets after each. The large collection of microfilms, photostats and reprints of papers held by the South Pacific Commission at their headquarters have been most valuable, and the publication is enhanced by the insertion of asterisks indicating which type of copy is available.

This admirable publication, which clearly entailed a tremendous amount of careful study and compilation, is an extremely useful review of the epidemiological history of filariasis in the South Pacific Region.

H. J. O'D. Burke-Gaffney

SOUTH PACIFIC COMMISSION. Noumea, New Caledonia. **Studies on the Epidemiology of Filariasis on Central and South Pacific Islands** [BYRD, E. E. & ST. AMANT, L. S.]. *Technical Paper No. 125.* 1959, Sept., v + 90 mimeographed pp., 7 charts & 1 map. [15 refs.] [6s.]

This report on filariasis in the Pacific area was prepared by a special epidemiology unit of the United States Navy in 1945. Blood films from 5,578 persons were examined and 895 (16·05%) showed microfilariae, the incidence varying according to geographical source from 8·3% to 19·9%. Only 5 white persons, all negative, were examined. A *Wuchereria malayi* incidence of 8·3% was found in 520 Tonkinese contract labourers, but all other infections were due to *W. bancrofti*. In Polynesians infection rose throughout life to a maximum of 41·3% at 50 years. In male children an incidence of 5% was soon reached and this remained steady until the age of 16 to 20 when it rose to 20% and increased steadily. Female children showed higher infection rates until 15 years when male incidence became greater. The reasons for these differences are discussed. Polynesians who are infected by day-biting vectors show lower infection rates than Melanesians who are infected in their homes at night. The incidence of clinical filariasis is described, and periodic and aperiodic microfilarial variation is discussed.

Mosquitoes from the various islands were identified and infection rates estimated. In American Samoa *Aëdes pseudoscutellaris* and *Culex fatigans* were infected but only the former harboured mature forms. As indicated by the ages of successively ingested filarial larvae in multiple infections, the mosquitoes are thought to feed every 3 or 4 days. In experimentally infected *A. pseudoscutellaris* some 57% died in the first 5 days and it is believed that this occurs in nature. *Anopheles farauti* was the vector in the New Hebrides and transmission by this species was prevented by weekly pyrethrum spraying of the huts. In the Solomon Islands a human infection rate of 45% was

found and multiple infections were found commonly in the vectors. The habits of the vectors are described.

The report concludes with a brief discussion of control. Since it was written before the employment of residual insecticides an attack on breeding is recommended. Though this would require determination and intelligence on the part of the population, a knowledge of the breeding habits and restriction of *Aëdes pseudoscutellaris* would facilitate the campaign. *T. H. Davey*

CHOW, C. Y., LIE KIAN JOE, WINOTO, R. M. P., RUSAD, M. & SOEGIARTO. **The Vector of Filariasis in Djakarta and its Bionomics.** *Bull. World Health Organization.* Geneva. 1959, v. 20, No. 4, 667–76.

Wuchereria bancrofti infection, with nocturnal periodicity, is found in certain parts of Djakarta, the capital of Indonesia [this *Bulletin*, 1958, v. 55, 1258]. The infection rate in man is 7·8%. The mosquitoes, *Culex fatigans*, *Mansonia uniformis*, *Anopheles aconitus*, *A. nigerrimus*, *A. subpictus subpictus* and *A. s. malayensis* were collected in houses but *C. fatigans* was the most common species throughout the year 1956–57, the other species appearing only in small numbers.

Out of a total of 24,271 females of *C. fatigans* dissected, 1·8% were infected and 0·3% contained infective larvae. Infected mosquitoes were captured throughout the year. One female of *M. uniformis* was found to contain exsheathed microfilariae. The frequency distribution of the larvae in the mosquito and the part of the body of the mosquito infected are recorded in 3 tables. The average number of mosquitoes biting per minute was found to be 2·2 and this, multiplied by the average number of all stages of larvae per mosquito (0·12), gives a potential transmission index of 0·26.

The type of breeding place, seasonal prevalence, resting habits and time of entry and feeding of *C. fatigans* are also described. The females were found to feed throughout the night but most fed mosquitoes (35%) were captured in the third quarter of the night (0–3 a.m.). Hourly collections showed the greatest number of females entering between 7 and 8 p.m., one to two hours after sunset. Inside the houses the females were found to rest mainly on furniture, curtains, mosquito nets and similar objects in the rooms (55%). On the walls most females rested below the height of 2 metres.

Adults and larvae showed high resistance to DDT and dieldrin and, in an area not previously treated with insecticide, the mosquitoes developed resistance after only 3 to 4 weekly applications of dieldrin, and the dosage had to be doubled or trebled to produce the same percentage kill as obtained at first.

B. R. Laurence

SOUTH PACIFIC COMMISSION. Noumea, New Caledonia. **Supplement to Annotated Bibliography on Filariasis and Elephantiasis. Part 3. Symptomatology, Aetiology, Pathology and Diagnosis of Filariasis due to** *Wuchereria bancrofti* **and** *W. malayi* [IYENGAR, M. O. T.]. *Technical Paper No. 109.* (*Suppl. No. 1.*) 1959, Jan., 25 mimeographed pp., 1 map. [2s.]

[See this *Bulletin*, 1956, v. 53, 1365.]

CARAYON, A., COLLOMB, H. & SANKALE, M. Du polymorphisme des complications neuro-psychiques des filarioses (à propos de quatre observations personnelles dont deux inédites). [**Polymorphism of the Neuro-Psychic Complications of Filariasis**] *Bull. Soc. Méd. Afrique Noire Langue Française*. Dakar. 1959, v. 4, No. 3, 299–312. [57 refs.]

The discovery of microfilariae in the cerebrospinal fluid has been regarded as accidental—the result of cerebrospinal vicissitudes in microfilaria carriers, but they are much too frequent to be purely coincidental. Since the first communication by A. LORENTZ in 1890 a number of authors have reported neurological syndromes attributable to filariasis and the present authors believe that by now over 50 cases have been reported in the literature. They themselves have observed 4, 2 already published (*Méd. Trop.*, 1954, v. 14, 663, 678) and 2 now described for the first time.

The cerebrospinal fluid is clear in the latent forms and contains no trace of blood, but, as BONNETT (*Méd. Trop.*, 1943, v. 3, 273) has remarked, the parasites do not appear to produce any particular disturbance.

KENNEY and HEWITT (1950) [this *Bulletin*, 1951, v. 48, 488] observed psychiatric manifestations in 2 Europeans from the Belgian Congo infected with *Loa loa*. Two other cases reported by them came from British Guiana: the patients were asthenic, apathetic and sometimes irritable: they were infected with *Wuchereria bancrofti*. The evolution of the mental manifestations may be very slow and long delayed. These are divided into several categories such as encephalitic, meningitic, extrapyramidal, etc. There is a particular form of eosinophilic meningitis which was first described by GALLAIS (*Méd. Trop.*, 1942, v. 2, 601, 769), and it is possibly of filarial origin, though no parasite was isolated.

The authors' 4 cases are described in detail. The first patient had psychiatric manifestations, a cortical lesion and temporary papillary stasis. *Loa loa* was present in the blood. Response to diethylcarbamazine was dramatic. The second patient also had a *Loa* infection, but his condition was purely psychiatric. Response to diethylcarbamazine was immediate, but incomplete. The third had chronic spasms of the right arm and left temporal oedema. *W. bancrofti* was present in the blood. Response to the drug was good. The last patient had a sudden meningeal haemorrhage and 8 days later a confusional syndrome. *W. bancrofti* embryos were present in the blood and cerebrospinal fluid. Cure was spontaneous.

The authors discuss the diagnosis and possible causes of these complications and suggest that neuro-allergy is present. The literature is reviewed and it is admitted that few of the observations are irrefutable. *Philip Manson-Bahr*

DESPREZ, P. Une localisation rare de filariose oculaire à *Wuchereria bancrofti*. Premier cas malgache de présence de microfilaire de Bancroft dans la chambre antérieure de l'oeil. [**First Case in Madagascar of Microfilariae of *Wuchereria bancrofti* in the Anterior Chamber of the Eye**] *Méd. Trop.* Marseilles. 1959, Nov.–Dec., v. 19, No. 6, 687–91, 1 fig. [23 refs.]

See this *Bulletin*, 1955, v. 52, (285); 1958, v. 55, (1261)

LØNNUM, I. Filariose med bullös dermatitt under carbamazidbehandling. [**Filariasis with Bullous Dermatitis during Treatment with Carbamazine**] *Nordisk Med.* 1959, Aug. 13, v. 62, No. 33, 1224–5, 1 fig. [13 refs.] English summary (6 lines).

A missionary who had resided in the Belgian Congo for 5 years developed filariasis, with itching and oedema of the right hand and forearm and the right side of the thorax. Treatment with carbamazine was given, but had to be interrupted after 3 days on account of intense itching. All symptoms disappeared after 1 month and the patient remained well for several weeks. On the way home to Norway a similar attack developed in the left arm, and was treated with promethazine and a carbamazine preparation which contained histaphen. Promethazine was discontinued after 3 days on account of drowsiness, and the patient immediately developed an intense allergic reaction with itching, oedema, erythema and a bullous eruption on the left hand and forearm accompanied by an eosinophilia of 30%, which was presumably due to sensitization to the decomposition products of the parasite. Under treatment with prednisolone the symptoms disappeared after several days. *D. J. Bauer*

RACHOU, R. G. & FERREIRA, M. O. Nota preliminar sôbre o contrôle quimioterápico da filariose bancroftiana em uma localidade do Sul do Brasil. [**Preliminary Note on the Chemotherapeutic Control of** *Wuchereria bancrofti* **Filariasis in a Locality in Southern Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1958, Oct., v. 10, No. 4, 391–6. English summary.

This note refers to the use of diethylcarbamazine (6 mgm./kgm. daily for 7 days) in the control of carriers of filariasis due to *Wuchereria bancrofti* [this *Bulletin*, 1959, v. 56, 1169] which the authors undertook in Ponta Grossa, Santa Catarina, in December 1953 and the study of which still continues. After a discussion of the epidemiological features, they give detailed results which are summarized in a table. Surveys were repeated in March, June and December 1954, and in the December of the next 3 years.

The various epidemiological indices fell considerably in the first 3 years after this course (the microfilaria index was reduced from 14·5% to 2·5%), but increased slightly in the fourth year when infective larvae reappeared, although they had been absent for 2 years.

The authors suggest that control may be achieved by giving this course every 3, or better still every 2 years or even once a year. They repeat their suggestion, however, that on practical grounds a single dose of 6 mgm./kgm. might be given to the whole population every 6 months. *H. J. O'D. Burke-Gaffney*

WU, Yao-Tsing *et al.* **Filariasis and its Control in Taiwan.** *J. Formosan Med. Ass.* 1959, Apr. 28, v. 58, No. 4, 228–38, 1 map & 6 figs. on 2 pls. [21 refs.]

Previous reports on filariasis in Taiwan [FAN and HSU, this *Bulletin*, 1957, v. 54, 66; 1443; CHUANG *et al.*, 1958, v. 55, 291] have shown this to be an important public health problem. The campaign reported here was undertaken

in order to identify and treat all carriers of microfilariae; 181,478 military personnel and 58,779 civilians were examined about midnight by means of a single blood film of about 10 cmm. from each. Among the civilians 3,896 carriers (6·63%) of *Wuchereria bancrofti* were found, and in the soldiers 2,436 carriers (1·34%). Of these latter 711 carried *W. bancrofti*, 455 *W. malayi*, 62 were mixed infections and 1,208 were not identified. Those found to be positive among the indigenous population of Taiwan were or had been residents of the Pescadores islands. In Pescadores civilians the incidence was slightly higher in females than in males below the age of 20 and the reverse above it, while in both sexes incidence increased steadily with age to a maximum of 12·4% at above 60 years of age.

Microfilaria carriers were treated in hospital with diethylcarbamazine 2 mgm./kgm. body weight 3 times daily for 2 weeks, and, if microfilariae were still present, for a further week or longer until the microfilariae vanished. Nearly 100% of military and about 91% of civilian carriers were treated. Among civilians positive, 8·9% received no treatment and 21·1% were not examined after treatment.

Since this campaign will not have eliminated transmission it is recommended that a filariasis surveillance scheme should be established for the detection and elimination of endemic foci or cure of imported cases. Systematic sampling would be done in suspected foci and among the neighbours of known carriers. Any foci disclosed should be eliminated by a combined attack on the reservoir and the vector. *T. H. Davey*

BABERO, B. B., SHEPPERSON, Jacqueline R. & SICAY, Teofila C. **Additional Records of Gnathostomes in North American Hosts.** *Rev. Biologia Trop.* San José, Costa Rica. 1959, July, v. 7, No. 1, 63–6. [11 refs.]

The authors have already reported the finding of gnathostomes in animals in various areas in Georgia [this *Bulletin*, 1959, v. 56, 643]. In these widely separated endemic areas (Fort Valley, Dublin, Darien and Fort Stewart) they have recovered gnathostomes from 22 raccoons (stomach), 14 opossums (stomach and liver), 2 skunks (stomach) and 1 snake (larval stage; parietal peritoneum).

The authors have doubts as to the validity of the species reported from raccoons and opossums in this area, since they have not been able to distinguish them satisfactorily from *Gnathostoma spinigerum*.

Evidence is presented for the pathogenicity of the gnathostomes in raccoons and it is concluded that investigation is required as to the effect that these parasites may have on the survival of certain mammals in North America.

H. J. O'D. Burke-Gaffney

JACKSON, G. J. **Fluorescent Antibody Studies of *Trichinella spiralis* Infections.** *J. Infect. Dis.* 1959, Sept.–Oct., v. 105, No. 2, 97–117, 29 figs. on 10 pls. [49 refs.]

Antisera were obtained from rabbits infected with *Trichinella* and were "labelled" by conjugation with certain fluorescent compounds such as diiodofluorescein. By this technique the situation of antigens can be identified by their combination with the fluorescent antibodies. When adult worms were incubated in these antisera, a heavy precipitate was formed around the oral

orifice, and smaller ones at the anal and vulval orifices. The same occurred with larvae digested from muscle. No precipitates were formed around larvae which had just emerged from the female. The antibodies were present in the gamma globulin fraction of the serum. The reaction between antibody and antigens was specific and no reaction occurred between *Trichinella* worms and antisera to *Nippostrongylus*. Antibody did not become attached to bodies of living worms, although it was attached to dead worms.

When histological sections were made of the worms, and when these were treated with fluorescent antiserum, it was found that the digestive tract of the worm, and sometimes the reproductive tracts of adults and of larvae were stained and became fluorescent. In some cases the muscle was also stained. Muscle larvae in cysts which had begun to calcify were slightly stained. There seem to be several distinct antibody-antigen reactions in the *Trichinella*-host. system. The primary effective antigens in rabbits infected with *Trichinella* are the digestive secretions and excretions, which presumably are formed by the cells of the alimentary tract. The staining of the reproductive organs of adults and larvae in sections shows that other secondary effective antigens are also present; presumably these are never set free unless an occasional violent cellular reaction may liberate some larval antigens. The cuticle is not antigenic, perhaps because its components are insoluble.

[This is a very interesting paper, well illustrated with numerous photographs. It should be studied in the original by all who are interested in the immunology of nematode infections.] *F. Hawking*

DEFICIENCY DISEASES

MAZER, A. Enquête-sondage alimentation-nutrition faite dans le Hodh (Mauritanie) (février–mars 1959). [**A Preliminary Enquiry on Food and Nutrition carried out in Hodh, Mauritania (February–March 1959)**] *Bull. Inst. Nat. Hyg.* Paris. 1959, Sept.–Oct., v. 14, No. 5, 951–65.

The staple food is millet, but some wheat is grown. There is usually sufficient milk (cow's, goat's or camel's), except in the dry season. This is the principal source of protein. Dates are widely grown, but other fruits and vegetables are only available in limited amounts. A clinical examination was made of 538 children. Serious malnutrition was not found; gingivitis was very common, but whether this could be attributed to a low intake of vitamin C is uncertain.

The nutrition of the people would be improved if there was more cultivation of fresh fruits and vegetables. *R. Passmore*

DARBY, W. J. *et al.* **A Nutrition Survey of the Armed Forces of the Philippines.** *Amer. J. Clin. Nutrition.* 1959, Nov.–Dec., v. 7, No. 6, 657–701, 5 figs. [40 refs.]

GILBERT, Christine & GILLMAN, J. **Some Methodological Problems affecting the Supplementation of Maize assessed biologically with special reference to the Value of Skimmed Milk Powder, Soyabean, Food Yeast and Casein.** *South African J. Med. Sci.* 1959, July, v. 24, Nos. 1/2, 41–80, 23 figs. [11 refs.]

BENEDEK, T. **Skin Manifestations of Hypovitaminosis A.** *Internat. Ztschr. f. Vitaminf.* Berne. 1959, v. 30, Nos. 1/2, 10–36, 4 graphs. [48 refs.]

BANERJEE, S. & BAL, Helen. **Studies on Changes in Bone Marrow and Blood Picture in Monkeys during Progressive Stages of Scurvy.** *Indian J. Med. Res.* 1959, Nov., v. 47, No. 6, 646–51. [26 refs.]

BANERJEE, S. & BAL, Helen. **Biochemical Changes in Scorbutic Rhesus Monkeys.** *Indian J. Med. Res.* 1959, Nov., v. 47, No. 6, 663–7. [25 refs.]

STRANSKY, E. & DIZON-SANTOS-OCAMPO, Perla. **On Rickets in the Tropics. III.** *J. Philippine Med. Ass.* 1959, Oct., v. 35, No. 10, 681–5.

"The blood chemistry findings in 50 cases of rickets are tabulated and presented. The reasons for the presence or absence of characteristic changes are discussed. While rickets is frequent in the tropics, knowledge about the symptoms and their appreciation is still insufficient."

[See this *Bulletin*, 1958, v. 55, 1153.]

WISHAHY, A. G. **Clinical Studies on Pellagra in Infants and Children.** *J. Egyptian Med. Ass.* 1958, v. 41, Nos. 11/12, 553–60, 10 figs. on 7 pls.

The main clinical findings in 50 children in Cairo with pellagra are summarized. Multiple dietary deficiencies are often present, including insufficient protein, thiamine and riboflavine, as well as niacin. The mental symptoms were mostly apathy, misery and dullness, but one child of 8 with mania was seen. *R. Passmore*

TASKER, P. W. G. **Ferrokinetics and Iron Utilization in Malnutrition. A Study using Radioactive Tracer Methods.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, Nov., v. 53, No. 6, 467–74, 4 figs. [20 refs.]

"Radioactive tracer studies using ^{59}Fe given intravenously, have shown that the plasma iron turnover rate was depressed in severe malnutrition, especially when compared with the value expected from an uncomplicated iron deficiency anaemia of comparable severity. The subsequent utilization of the radioactive tracer tended to be slow but the final uptake was normal.

"These results are interpreted as demonstrating an interference with the erythropoietic activity of the bone marrow, but less interference with the use of iron in the synthesis of haemoglobin."

DUPIN, H. **Étude des carences protidiques observées chez l'enfant en pays tropical (Kwashiorkor).** [A Study of Protein Deficiency, as observed in the Infant in Tropical Countries (Kwashiorkor).]

This book was reviewed on p. 275.

HAEMATOLOGY

SCHEITLIN, W. & FRICK, P. Erythrocytenüberlebenszeit-Bestimmungen mit der Cr^{51}-Methode bei hämolytischen Anämien unter Therapie. [**The Determination of Red Cell Survival Time with the ^{51}Cr Method in Haemolytic Anaemias under Treatment**] *Schweiz. med. Woch.* 1959, Dec. 19, v. 89, No. 51, 1328–31, 9 figs. [13 refs.]

Thanks to the development of exact quantitative methods for the determination of the life-span of the erythrocytes, the haemolytic processes in various anaemias can now be observed directly. Whereas the original technique utilized the breakdown of transfused compatible red cells of a different group from that of the patient, nowadays it has become possible to measure the life-span of the patient's own cells by marking them with radioactive chromium.

The present paper reports on the use of this technique in demonstrating successes of therapy in spherocytic jaundice, acquired haemolytic jaundice, folic acid deficiency with haemolytic anaemia, and renal anaemia. Therapy consisted either in splenectomy or cortisone treatment in the first two groups, and in specific folic acid therapy for the deficiency anaemia and haemodialysis (artificial kidney) in a patient with cystic kidney and toxic anaemia.

H. Lehmann

SHNIER, M. H. & METZ, J. **Megaloblastic Anaemia in Infancy with special reference to Treatment with Vitamin B_{12}.** *South African Med. J.* 1959, Nov. 28, v. 33, No. 48, 1009–12. [14 refs.]

This paper reports the clinical features and response to treatment of 45 out of the 68 children who were found to have a megaloblastic anaemia in the paediatric department of the Baragwanath Hospital over a 3-year period. During this period 800 malnourished children were admitted, giving an incidence of 8·5% for megaloblastic anaemia in children sufficiently malnourished to be admitted to hospital. Of the 45 children studied, 29 showed the features of protein malnutrition, 13 were marasmic, and 3 were fairly well nourished. 86% of the subjects suffered from infections, diarrhoea being the commonest complaint.

Some children were treated with ward diet only, others received either folic acid or vitamin B12, and some were given blood transfusions; but evidently treatment was not planned so that the efficacy of the various measures could be compared. However, it is notable that 18 of the more severely affected children responded well to B12.

The authors think that malnourished children may be deficient in both vitamin B12 and folic acid, but owing to their nutritional state and the slowing of their rate of growth, they may not show megaloblastic anaemia. It is suggested that some additional factor, possibly infection, is required to precipitate these marrow changes.

Alan B. Raper

METZ, J. **Hereditary Spherocytosis in the Bantu.** *South African Med. J.* 1959, Dec. 5, v. 33, No. 49, 1034–6, 2 figs.

COUNCIL INTERNAT. ORGANIZATIONS MED. SCI.: MIDDLE EAST SCI. CO-OP. OFFICE UNESCO, **A Laboratory Manual on Abnormal Haemoglobins.** [JONXIS, J. H. P. & HUISMAN, T. H. J.]

This book was reviewed on p. 319.

VELLA, F. & SINGH, R. B. **Haemoglobin L in Indians in Malaya.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, Nov., v. 53, No. 6, 534–5.

The authors detected the trait for haemoglobin L [this *Bulletin*, 1957, v. 54, 1234] in 2 unrelated male Indians during a survey for abnormal haemoglobins in Singapore. The first was a healthy blood donor of 33, born in Karachi of Sindhi parents. His haemoglobin was a mixture of Hb A and a slower component which was identified by paper electrophoresis and ion exchange resin chromatography as Hb L by Drs. LEHMANN and AGER. The second specimen came from a Punjabi Sikh student aged 19. It showed a similar slow component, also identified as Hb L. Identical components were found in the blood of his father, a brother and a sister; the blood of the mother and another sister contained only Hb A. No abnormalities were found in blood smears from members of the family.

These were the only examples of Hb L found in Indians in Singapore so far among 2,500 blood samples, but it is mentioned that instances of the trait for haemoglobins D, E, K and J have been found in this group and are under publication.

The findings confirm the impression that a focus for this haemoglobin variant exists in the north-western parts of the Indian sub-continent.

H. J. O'D. Burke-Gaffney

SONNET, J. & MICHAUX, J. L. Considérations sur l'hyperglobulinémie du Bantou normal. [**Reflections on the Hyperglobulinaemia of the Normal Bantu**] *Ann. Soc. Belge de Méd. Trop.* 1959, Aug. 31, v. 39, No. 4, 495–505, 2 figs. (1 on pl.). [18 refs.]

Whereas in the healthy European the serum zinc sulphate turbidity amounts to 8–12 units, the same test yields consistently higher values, more than 15 units, in the healthy Bantu. The difference is due to a higher globulin content of the serum in Africans. The authors have compared 26 sera each from normal Europeans and normal Bantus, and found a higher albumin level as well as a higher albumin/globulin ratio in the European group. The Africans on the other hand showed a considerably higher gamma globulin level.

	Total Protein gm.%	Albumin gm.%	Globulin gm.%	A/G
26 Europeans	7·17 ± 0·51	4·60 ± 0·44	2·56 ± 0·48	1·87 ± 0·49
26 Bantus	7·03 ± 0·54	4·11 ± 0·40	2·92 ± 0·48	1·41 ± 0·30

On electrophoresis this fraction was seen to amount to 13·19 ± 2·9% in the European group and to 21·51 ± 3·06% in the other.

When the sera of Europeans and Africans were compared by immunoelectrophoresis no evidence could be found that the differences were anything but quantitative.

The serum mucoproteins were lower in the Africans than in the Europeans. The authors consider that this suggests that the Africans, though considered "normal", nevertheless suffered from some parenchymatous liver disorder. This would explain their higher gamma globulin level and somewhat lower albumin level. The authors see no cause for assuming that the higher gamma globulin level in Africans is a racial rather than an inherited character.

In the discussion at the end of this paper K. Holemans summarizes the evidence in favour of the non-racial character of the hyperglobulinaemia of the African. (1) The albumin/globulin ratio in newborn European and African children is identical and decreases in the African children only as they grow older. (2) Recent work has contradicted earlier claims that the serum protein composition of American Negroes differed from that of American whites. (3) White subjects living on a protein deficient diet, as for instance inmates of concentration camps, experienced the changes in serum protein found in Africans. Also, characteristic serum protein changes can be produced in animals when they are placed on a protein deficient diet.

H. Lehmann

VENOMS AND ANTIVENENES

Tu, Tsuchih. **Toxicological Studies on the Venom of a Sea Snake,** *Laticauda semifasciata* **(Reinwardt) in Formosan Waters.** *J. Formosan Med. Ass.* 1959, Apr. 28, v. 58, No. 4, 182–203, 10 figs. [15 refs.]

The commonest sea-snake in Formosan waters is *Laticauda semifasciata.* The author examined some of the pharmacological properties of freshly obtained venom from this snake.

In mice a lethal dose of venom led to respiratory disturbances, clonic convulsions and finally respiratory paralysis. The venom was more toxic than that of *Naja naja*, *Vipera russelli* or *Trimeresurus gramineux,* but less toxic than that of the krait *Bungarus multicinctus.* The venom was lethal to guineapigs and rabbits.

In the laboratory the venom depressed respiration in the rabbit and raised the blood pressure. It stimulated the heart muscle of frogs and rabbits; it caused a transitory vasodilatation followed by vasoconstriction in the vessels of the rabbit's ear. In small doses it stimulated the muscle of the rabbit small intestine; in large doses it inhibited the muscle. It stimulated the uterine muscle, and the muscle of the earthworm. It had a curare-like action and a direct paralytic effect on the gastrocnemius muscle of the frog.

The average yield from the poison glands was 0·42 mgm. dried venom. Occasional snakes produced considerably more. For this reason, the author considers that bites could possibly be fatal in man, although as a rule the effects are usually slight.

B. G. Maegraith

CHEN, Bei-Loo. **On the Keeping Quality of Snake Antivenin with a Suggestion on Antivenin Dosage for Poisonous Snake Bite in Taiwan.** *J. Formosan Med. Ass.* 1959, May 28, v. 58, No. 5, 253–7.

The author tested the potency of certain antivenenes (sera made from native horses) kept over periods of many months at a temperature range of 3 to 10°C. The antivenenes were tested from time to time, the end point being the dilution which protected 75% inoculated mice. Dried venoms were used as controls. Antivenenes made from neurotoxic venoms (*Naja* spp. and *Bungarus* spp.) kept better than those made from haemotoxic venoms (*Ancistrodon* spp. and *Trimeresurus* spp.). *B. G. Maegraith*

WAJCHENBERG, B. L., SESSO, J. & INAGUE, T. Feições clinico-laboratoriais do envenenamento crotalico humano. **[Clinical and Laboratory Features of Human Rattlesnake Poisoning]** *Rev. Assoc. Med. Brasileira.* 1954, June, v. 1, No. 2, 179–93, 1 fig. [23 refs.] English summary.

i. GRAUER, F. H. **Dermatitis Escharotica caused by a Marine Alga.** *Hawaii Med. J.* 1959, Sept.–Oct., v. 19, No. 1, 32–4, 3 figs.

ii. BANNER, A. H. **A Dermatitis-Producing Alga in Hawaii. Preliminary Report.** *Ibid.*, 35–6.

i. In July and August 1958 a dermatitis not previously reported in Hawaii occurred among swimmers, and more than 125 cases were treated. An itching, burning sensation was followed in 3 to 8 hours by dermatitis beginning with redness, followed by blisters and desquamation, and leaving a moist red tender area. The sites affected were those covered by swimming trunks and, in women, occasionally the breast area.

Treatment is that of a superficial chemical burn, usually with wet compresses and bland ointment.

The cause is an olive green alga, probably *Lyngbya majuscula*, which forms a hair-like mass, fragments of which get under the bathing dress.

Tests showed that soap and water bathing immediately after swimming was of definite prophylactic value. Thorough washing of the bathing suit to prevent exposure the next time that it was worn was also useful. Clearing the beaches of accumulated seaweed should also help.

ii. *Lyngbya majuscula* is widespread throughout the tropical Pacific and Indian oceans but was less abundant than it is at present. By patch tests, guineapig injections or by feeding to mice it was found that certain strains were highly toxic. These were of red rather than olive green colour and had a localized distribution. This may account for the fact that some ground fish, like red snappers, occasionally contain a paralytic toxin known as "*Ciguatera*-type" and are dangerous to eat in certain areas of the tropics. The present study, however, has not confirmed this theory as the solubilities of the *Lyngbya* and *Ciguatera* toxins are different. Moreover the distribution of the toxic algae does not coincide with that of the poisonous fish. *H. T. H. Wilson*

TOXOPLASMOSIS

SEEMAN, J. Sérologické nálezy toxoplazmózy u koní a jiných domácích zvířat. [**Serological Findings of Toxoplasmosis in Horses and other Domestic Animals**] *Českoslov. Epidemiol., Mikrobiol., Imunol.* Prague. 1959, v. 8, No. 4, 228–34, 1 graph. [14 refs.] English summary (8 lines).

The sera of 523 horses sent to slaughterhouses in Prague from various parts of Czechoslovakia, Rumania and Bulgaria were examined for evidence of *Toxoplasma gondii* infection in complement-fixation tests with antigens prepared from the peritoneal exudates of mice or the chorioallantoic membranes of fertile eggs infected with the causative organism. Positive results in titres ranging from 16 to 128 were obtained with 129 of 389 sera (33·2%), the remainder being anticomplementary or giving unspecific fixation. Antibody in significant titres was also found in the sera of 17 of 44 pigs (38%), 36 of 77 cats (47%) and 6 of 15 dogs (40%). *D. J. Bauer*

EYLES, D. E., GIBSON, C. L., COLEMAN, Nell, SMITH, C. S., JUMPER, J. R. & JONES, Frances E. **The Prevalence of Toxoplasmosis in Wild and Domesticated Animals of the Memphis Region.** *Amer. J. Trop. Med. & Hyg.* 1959, July, v. 8, No. 4, 505–10. [16 refs.]

Information regarding toxoplasmosis in 2,300 animals in and around Memphis, Tennessee, U.S.A. over the last 7 years is summarized and the implications to man are discussed. [Many of the findings have already been published separately.]

Cats and dogs appear to be the most important reservoirs; infection in chickens, ducks (2 of 3 birds infected), rats, mice and swine was often associated with an active human focus, and the interesting suggestion is made that man's environment plays an important part in the epidemiology of the infection: no infections were ever demonstrated (parasitologically) in wild animals unassociated with man (*e.g.* in rodents and birds). 30 vultures showed no evidence of infection, which finding is of interest because these birds consume both meat and sick animals. *P. C. C. Garnham*

BÉQUIGNON, R., SERGENT, G. & VIALAT, C., with the technical collaboration of M. COLLOMBIER & G. GAREAU. A propos des examens histologiques systématiques des névraxes d'animaux mordeurs. [**Considerations on a Systematic Histological Study of the Central Nervous System of Biting Animals**] *Ann. Inst. Pasteur.* 1959, June, v. 96, No. 6, 702–11, 18 figs. on pl. [20 refs.]

In the course of the examination for evidence of rabies of sections of brains of domestic animals, the authors encountered much evidence of toxoplasmosis. Thus, in 295 out of 342 dogs, and in 88 out of 98 cats, this infection was diagnosed (in 1956, 1957 and 1958). Rabies was found in only 31 of the dogs and 2 of the cats. These animals had been brought to the laboratory because they showed signs of encephalitis or other nervous disorders. The diagnosis was made after fixation in Bouin's fluid and staining in Mann's stain, both by the histological changes and the appearance of "pseudocysts" or adult forms of the organism. The nature of the organism was confirmed [in an

unstated number of instances] by intraperitoneal inoculation of infected material into mice.

Calcification of the lesions in the central nervous system was not detected, and it appears that the nervous manifestations arose as an acute process during the chronic disease; nearly always, infection was also found in the skin, lungs, myocardium, abdominal organs and the eye. It is stated that the "classical form" of the organism was found (as inclusions) in the cytoplasm or nucleus of a variety of nerve cells, and that "terminal colonies" [this *Bulletin*, 1948, v. 45, 117] largely replace the normal structure of certain focal areas in the cerebrum and cerebellum.

[The paper is accompanied by 18 photomicrographs which unfortunately are not clear enough to confirm the accuracy of these observations.]

P. C. C. Garnham

ERIKSSON, S., HULDT, G. & WAHLGREN, F. **Case of Acquired Toxoplasmosis with Microcyst in a Lymph Gland.** *Opuscula Med.* Stockholm. 1959, Dec., v. 4, No. 10, 361–4, 1 fig.

A case from Stockholm.

ETCHEVERRY, R., GUZMÁN, C., REGONESI, C., KATALINIC, V., MURANDA, M., FAIGUENBAUM, J., NEGHME, A. & THIERMANN, Erica. Aspectos biológicos y clínicos de la toxoplasmosis humana con especial referencia a la forma ganglionar. [**Biological and Clinical Aspects of Human Toxoplasmosis, with Special Reference to the Glandular Form**] *Rev. Med. Chile.* 1959, July, v. 87, No. 7, 532–40. [42 refs.]

The authors have already described cases of glandular toxoplasmosis in Chile [this *Bulletin*, 1957, v. 54, 479; 1958, v. 55, (1275)]. They now review the subject of toxoplasmosis in general, with special reference to this form and they compare the findings in Chile with those of workers elsewhere. Clinical, diagnostic, epidemiological and therapeutic features are discussed in relation to the literature.

17 cases of toxoplasmosis have now been confirmed parasitologically in Chile, 6 of them being of the glandular form: 20 cases of this form have also been diagnosed serologically. The authors refer particularly to their simple method of diagnosis by means of intraperitoneal injection of mice with a suspension of puncture material from a gland [*loc. cit.*]. Serological tests seem to indicate that toxoplasmosis is widely diffused in Chile. Since 1950 a special diagnostic service for toxoplasmosis has been organized by the Department of Parasitology of the University of Chile and the National Health Service and is available to doctors throughout the country.

H. J. O'D. Burke-Gaffney

VAN DER WAAIJ, D. Ontwikkeling en transmissiemogelijkheden van *Toxoplasma gondii* in experimentele infectie met chronisch beloop bij muizen. [**Development and Transmission of *Toxoplasma gondii* in Mice with Experimental Infection running a Chronic Course**] [Thesis.] 79 pp., 6 graphs & 6 figs. (5 on 2 pls.) 1959. Leiden: Laboratorium voor Parasitologie, Rijksuniversiteit.

In this thesis the author describes an experimental investigation on the development of *Toxoplasma* in mice, with special reference to cyst formation

and the mode of transmission of the infection. A short historical introduction is followed by a chapter (II) dealing with the size of the cysts in brain tissue, showing that within 4 months they grow from 7–8μ in diameter to 42–43μ. In the next chapters (III and IV) the nature of these bodies is considered: it is thought that the wall is formed by the parasites and therefore they should be regarded as true cysts and not as pseudocysts. The author believes that the defence mechanism of the host is stimulated by the gradual emergence of parasites from the cyst, thereby releasing the antigen. The liberated parasites give rise to further cysts, the number of which in the brain increases in the course of the infection. In chapter V the author considers the immune reactions of the host, which were tested by challenges: it is shown that resistance to superinfection develops gradually, reaching a maximum after 6 weeks. The next chapter (VI) is devoted to experimental transmission of the infection: this can be effected by feeding mice on cysts or organs containing them, whereas no infection was produced by the droplet method, or through the milk of infected mothers. Congenital transmission to the foetus was demonstrated in females infected during the first half of pregnancy, but not later. In the former case, post mortem examination revealed cysts in the mother's brain, and it is thought that toxoplasms escaping from the cysts infect the foetus *via* the blood stream. It was also shown that the parasite requires lysin for its reproduction, since in mice fed on a lysin-deficient diet (when the serum-albumin concentration is lowered and the amount of circulating globulins is reduced) the production of cysts in the host's brain is inhibited.

The data described in this paper are adduced in numerous tables, and are illustrated by a number of graphs and a plate of figures, depicting the development of the cysts. *C. A. Hoare*

CARVER, R. K. & GOLDMAN, M. **Staining *Toxoplasma gondii* with Fluorescein-Labeled Antibody. III. The Reaction in Frozen and Paraffin Sections.** *Amer. J. Clin. Path.* 1959, Aug., v. 32, No. 2, 159–64, 7 figs. [18 refs.]

It has previously been shown [this *Bulletin*, 1957, v. 54, 1237] that *Toxoplasma* can be stained specifically with fluorescein-labelled antibody in peritoneal exudate of infected mice. In the present paper the authors describe a method whereby these parasites can be demonstrated by similar methods in paraffin sections of tissues. Pieces of various organs from infected mice are fixed in Wolman and Behar's solution (19 parts of absolute methanol + 1 part glacial acetic acid) for 1–7 days, after which they are embedded in paraffin, and sections (4μ) are cut. After removal of the paraffin, sections are passed through xylol and alcohols, removed from 70% alcohol and dried in the air, after which 0·05 ml. of conjugate (globulin from human serum treated with fluorescein isocyanate) is placed on each section and allowed to stain for 1 hour at 37°C. in a moist chamber. The conjugate is then shaken off, and the sections are placed in saline and tap water for 30 and 10 minutes respectively. After drying, they are mounted in alkaline-buffered glycerol, and examined by fluorescence microscopy.

In preparations stained by this method, toxoplasms could be readily detected and their morphology was recognizable. It is claimed that "the specificity of the stain aids in identification when the organisms occur individually or in small groups".

The appearance of the parasites in sections is depicted in a series of photomicrographs. *C. A. Hoare*

SIMITCH, T., PÉTROVITCH, Z., BORDJOCHKI, A. & TOMANOVITCH, B. Contribution à la connaissance de la virulence de *Toxoplasma gondii* pour le chat. **[Study of the Virulence of *Toxoplasma gondii* for Cats]** *Arch. Inst. Pasteur d'Algérie*. 1959, June, v. 37, No. 2, 286–91.

53 cats, aged from 2 months to 2 years, were infected with 3 strains of *Toxoplasma gondii*, with the following results.

Strain CB (from Paris) was given orally in milk to 8 kittens, 3 of which became infected.

A Czechoslovakian strain was given orally to 13 cats (none of which became infected); intravenously to 1 cat (whose blood was found negative on inoculation 24–72 hours later, and whose organs were uninfected when the animal was killed on the 23rd day); intraperitoneally to 6 cats (1 of which died of acute toxoplasmosis on the 8th day, and another showed a latent infection).

A Yugoslav strain was given orally to 4 cats (none of which became infected); by introduction of the parasite into the pharynx of 9 cats (3 of which died of acute toxoplasmosis, and another developed a latent infection); subcutaneously to 2 cats (both of which died of acute toxoplasmosis); intraperitoneally to 10 cats (3 of which died of acute toxoplasmosis, and another developed a latent infection).

The positive results were all obtained in the younger animals; adult cats seem to be completely refractory. *P. C. C. Garnham*

DERMATOLOGY AND FUNGUS DISEASES

COUNTER, C. E. **The Disease called "Wildfire".** *Arch. Dermat.* 1959, Oct., v. 80, No. 4, 391–7, 4 figs.

"Fogo selvagem" [pemphigus foliaceus] means uncontrolled fire or wildfire. It is endemic in Central Brazil. The usual age of onset is between 10 and 30 and the earliest lesion is generally a vesicle in the centre of the face or the front of the chest. A distinct odour is a prominent and objectionable feature. Growth may be retarded, the secondary sex characteristics may be poorly developed and sterility may occur. Various clinical variants are seen, namely, acute, subacute and superacute (usually rapidly fatal) and chronic. The chronic type may be subdivided into:—

(1) Frustre (resembling pemphigus erythematosus).
(2) Bullous exfoliative, the commonest type.
(3) Pustular and ulcerative form.
(4) Verrucous and papillomatous form.
(5) Herpetiform form.
(6) Hyperpigmented form.

(7) Erythrodermic form.
(8) Intensely foliaceous form.
(9) Dystrophic form.

Microscopically alternating patches of hyperkeratosis and parakeratosis are seen. Bullae occur in the upper prickle cell layer close to the granular layer. Hyperpigmentation of the basal layer is a constant feature as is papillomatosis of the upper cutis.

2 methods of treatment are described—quinacrine [mepacrine] by mouth which caused remission in 58% of 151 cases, and hydrotherapy followed by a local application of tar sulphur and boric acid which was effective in 56·5% of patients treated.

It was felt that the hyperpigmentation produced by the latter form of treatment might be responsible for its success. *H. T. H. Wilson*

SMALL, M. J. **Late Progression of Pulmonary Coccidioidomycosis.** *Arch. Intern. Med.* 1959, Nov., v. 104, No. 5, 730–40, 19 figs. [13 refs.]

4 cases are described which suggest that pulmonary coccidioidomycosis, contrary to the commonly held belief, may become manifest long after exposure in the endemic area. It appears that this disease may progress slowly and spread *via* the bronchi from cavities previously considered inactive to produce infiltrations in the lung, indistinguishable by X-ray from those of tuberculosis. Such a spread may occur years after residence in a known endemic zone and the diagnosis must be considered in cases of pulmonary infiltration or cavitation where bacteriological evidence for tuberculosis is lacking.

A careful history giving evidence of residence in an endemic area together with the use of the coccidioidin and tuberculin tests are most useful in reaching a correct diagnosis. *Peter Abbott*

MACKINNON, J. E. Blastomicosis sudamericana experimental evolutiva por via pulmonar. [**Experimental Evolutive South American Blastomycosis obtained by the Pulmonary Route**] *An. Facul. de Med. Montevideo.* 1959, v. 44, Nos. 3/4, 355–8, 4 figs.

The English summary appended to the paper is as follows:—

"The infection of the mouse with the yeast-like form of *Paracoccidioides brasiliensis* has been easily obtained by the broncho-pulmonary route. An evolutive, fatal infection slowly developed in the lungs and hematogenous metastases were produced in the spleen, the liver, the adrenals, the brain, and also in the striated muscles: myocardium and tongue.

"Of five animals surviving more than five months three showed lesions in the adrenals.

"If the disease followed a similar course in man, the oropharyngeal lesions would be secondary, metastatic and contemporary with dissemination to important viscera."

TROPICAL OPHTHALMOLOGY

RODGER, F. C. **Blindness in West Africa.**

This book was reviewed on p. 201.

COSNETT, J. E. & MACLEOD, I. N. **Retinal Haemorrhages in Severe Anaemias. Their Diagnostic Significance.** *Brit. Med. J.* 1959, Nov. 14, 1002–4, 2 figs.

"During an analysis of 74 cases of severe anaemia among Indians the retinal appearances were studied in relation to the type and severity of the anaemia. It was found that retinal haemorrhages occur almost universally in severe megaloblastic anaemia and in anaemia associated with thrombocytopenia. Retinal changes occur rarely in cases of iron-deficiency anaemia or anaemia due to blood loss.

"Though this sign has been mentioned previously, it is felt that its value has not been sufficiently emphasized. It is diagnostically useful in communities where severe anaemias of these types are prevalent."

SCOTT, J. G. & TAYLOR, I. B. **Prevention and Cure of Trachoma. A Final Report.** *Med. Proc.* Johannesburg. 1959, Dec. 12, v. 5, No. 25, 540–42, 1 fig.

The authors stress that the recent isolation and culture of the trachoma virus in China [this *Bulletin*, 1958, v. 55, 96], England and South Africa, and the possible manufacture of a vaccine against trachoma, have not changed the basis of treatment with antibiotics. A vaccine, while possibly preventing trachoma, does not supersede the need for treatment of the actual disease. It is not curative, and present patients must go on receiving treatment.

They conducted a 3-year field trial in treating trachoma with 1% chloramphenicol ointment; the schoolchildren treated each other 3 times daily for 3 days in each month, and also took the ointment home to their younger brothers and sisters for the same treatment.

As a result, the incidence of trachoma in babies fell from 64% to 17% and it was felt that this scheme should be widened to include most areas where trachoma is endemic. *D. P. Choyce*

See also p. 394, DESPREZ, Une localisation rare de filariose oculaire à *Wuchereria bancrofti*. Premier cas malgache de présence de microfilaire de Bancroft dans la chambre antérieure de l'oeil. **[First Case in Madagascar of Microfilariae of *Wuchereria bancrofti* in the Anterior Chamber of the Eye]**

TROPICAL ENVIRONMENTAL CONDITIONS

BASSIR, O. **Urinary Excretion of Electrolytes by Healthy Nigerians fed on an Unrestricted Salt Diet.** *West African J. Biol. Chem.* 1959, Sept., v. 3, No. 2, 32–4, 3 figs.

The average 24-hour urine output of 99 healthy male and female students in Nigeria for 3 days was as follows: sodium chloride, 9·45 gm.; Ca,

250·9 mgm.; K, 2·3 gm.; volume, 1028 ml. There was no relation between NaCl output and volume, or height of the subject. Of these measurements only volume and NaCl values were somewhat lower than values in a temperate climate, owing, it is thought, to sensible perspiration. *M. L. Thomson*

TOOR, M., WERTHEIMER, E., MASSRY, S. & ROSENFELD, J. B. **[Development and Correction of Hypernatremia during a Two Hour Hike at 42°C. at Sodom]** *Harefuah*. Jerusalem. 1959, Nov. 1, v. 57, No. 9, [in Hebrew 244–8, 9 charts. (23 refs.) English summary 248].

The English summary appended to the paper is as follows:—

"There are numerous reports dealing with the problems of acclimatization to hot climates but only a few are concerned with the influence of hot climates on those native to the area.

"This paper reports the effects of a two hour hike carried out during the mid-day heat under different conditions, namely: (1) without fluid intake, (2) with free fluid intake, (3) with forced fluid intake.

"The experiments were carried out at Sodom on eight subjects, 18 to 26 years of age, residents at Sodom for a period of 6 months to two years. They were asked to walk for two consecutive hours at a speed of 6 kilometres per hour, outdoor temperature being 42°C.

"The results revealed that subjects without fluid intake developed hypernatremia in as short a time as two hours, this being accompanied by signs of secondary hyperaldosteronism. Drinking when thirsty did not always prevent the occurrence of hypernatremia.

"In subjects showing hypernatremia, the urinary excretion of $Na+$ was very low while excretion of $Cl-$ was much higher and pulmonary ventilation was increased.

"As a result of these changes, the pH, although decreased, remained at the lower limits of normal. Forced drinking could prevent and correct the hypernatremia despite the stress imposed by walking at this temperature.

"Whereas the subjects without fluid intake showed marked fatigue, thirst, dryness of the mouth and restlessness, those who drank at will complained only of tiredness."

MALHOTRA, M. S., SHARMA, B. K. & SIVARAMAN, R. **Requirements of Sodium Chloride during Summer in the Tropics.** *J. Applied Physiol.* 1959, Sept., v. 14, No. 5, 823–8, 3 figs. [20 refs.]

In this interesting investigation 24 acclimatized Indian subjects were divided into groups receiving 16·2, 11·2, 8·7, 6·2 and 3·1 gm. of salt per day. Urinary, plasma and sweat chlorides were measured in addition to thiocyanate space and body weight.

All measurements indicated that 6·2 gm. NaCl and higher intakes per day were adequate but that negative NaCl balance developed on 3·1 gm./day. Indeed certain symptoms of salt deficiency developed on this lowest intake: these did not, however, include cramps.

The arm sweat was found to be more concentrated than general body sweat.

It is concluded that most Indians consume adequate salt for their needs and that regulation is by taste rather than by necessity.

The chloride content of morning urines was the lowest of the day and these provide the best estimate of salt balance. If this was more than 0·06 Eq./ litre, salt deficiency was unlikely; if less than 0·03 Eq./ litre there was a possibility of salt deficiency.

[These results cannot be transferred directly to Europeans who frequently have a vastly different, and perhaps less suitable, diet in the heat.]

M. L. Thomson

BANNISTER, R. **Acute Anhidrotic Heat Exhaustion.** *Lancet.* 1959, Sept. 12, 313–16. [17 refs.]

Of 29 Army patients with heat illness admitted to hospital in Aden when shaded dry bulb temperature was 90–100°F., 12 had cessation of sweating without the accepted signs of hyperpyrexia or heat stroke. All said they had stopped sweating before they noticed any symptoms. They had been in Aden less than 2 weeks.

The skin was hot, flushed and dry, without prickly heat or other abnormality. Oral temperature averaged 100·4 and did not exceed 102°F. In only 2 cases was sunburn a possible cause. Biochemical findings indicated moderate water depletion but not salt deficiency. Normal temperature and sweating were regained within 12 hours or so of admission.

Recognition of this condition is important because heat stroke may supervene in hotter thermal environments.

The name " acute anhidrotic heat exhaustion " is suggested for this condition.

M. L. Thomson

BURCH, G. E., DE PASQUALE, N., HYMAN, A. & DEGRAFF, A. C. **Influence of Tropical Weather on Cardiac Output, Work and Power of Right and Left Ventricles of Man resting in Hospital.** *Arch. Intern. Med.* 1959, Oct., v. 104, No. 4, 553–60, 6 figs.

At about 90°F. dry bulb temperature and 74% relative humidity the cardiac output, measured by the direct Fick method, of 10 Negroes resident in New Orleans, was 57% higher than in a cool, air-conditioned ward (73°F.; 62%). Mean systolic and diastolic pressures for the group were lower in the heat but heart rate did not change significantly; thus the increased cardiac output was due to increased stroke volume.

The effect of heat on work done by the heart (pressure × volume) was inconstant from individual to individual, at times increasing the work of one ventricle in relation to the other.

M. L. Thomson

SOUTH AFRICAN COUNCIL SCI. & INDUST. RES.: UNIV. OF NATAL. **Symposium on Design for Tropical Living.** Durban, 18th October, 1957. Numerous mimeographed pp., illustrated. [Numerous refs.]

The theme of this symposium was the impact of the physical environment on man and his buildings in tropical and subtropical regions, with special reference to Natal. Since many factors are involved in planning for living, a group of specialists in various fields were brought together to review present

knowledge and to assess the needs for research. It was hoped that the interchange of views would stimulate thought about the possibility of shaping man's physical environment to suit his needs.

The symposium dealt first with the climatic environment in a paper by S. P. JACKSON, concerning which there was great need for data in the tropics because knowledge based on tradition and experience was lacking. The mechanism of heat loss from the body was discussed and also Brunt's method of expressing the limiting conditions for comfort in terms of temperature, relative humidity and wind strength. Then followed a paper on deterioration of materials under tropical conditions by T. L. WEBB and J. H. P. VAN AARDT.

The third paper by C. H. WYNDHAM dealt with physiological aspects of design for tropical living. He discussed the effective temperature scale and quoted the upper limits found by different workers. It is claimed that with good acclimatization man can work at a moderate rate up to 92° or 93°F. wet bulb temperature. The limit for hard work is 90°F. wet bulb, and unacclimatized people should not do hard work above 84°F. or moderate work above 87°F. wet bulb; above these figures collapse and heat stroke are liable to occur. The incidence of minor illness, including summer diarrhoea of children, and of skin lesions was increased considerably when mid-day effective temperatures rose over 80°F. ET.

The next paper, by S. BIESHEUVAL, dealt with psychological aspects of life in a warm climate. He claimed that climatic chambers were only useful for short-term studies. Tropical neurasthenia was often due primarily to neurotic personality aggravated by climate which enhanced the fatigue arising from anxiety states and incompatability with the habitat. Morale and mental discipline protected against psychological disturbance. There was no satisfactory method of measuring the effect of climate on work performance. Work in the tropics had to be taken at a slower speed or it would cause stresses affecting performance.

Town and regional planning was then discussed by Sir W. HOLFORD. The principles of planning in hot climates were described and their employment to increase health and comfort. This was followed by a paper by S. J. RICHARDS on climate control by building design, dealing with the means of improving the thermal conditions in buildings and containing much useful information. The next paper, by S. J. P. JOUBERT, discussed air-conditioning in the tropics; it described the various systems and the circumstances in which they were most useful. The last paper, by Professor P. H. CONNELL, dealt with architecture in the tropics and it summarized the information given in the preceding addresses. Conventional types of housing in the tropics should be discarded and better-adapted types built. The climatic zones of the tropics were described and the principles of building associated with them. The influence of hygiene on architecture was pointed out and its importance in development of architecture in the tropics.

[This is a most interesting series of papers which should be of value to anyone concerned with development of tropical peoples.] *T. H. Davey*

MISCELLANEOUS DISEASES

SCHNEIDER, J. **Les maladies tropicales dans la pratique médicale en France.** [Tropical Diseases in Medical Practice in France]

This book is reviewed on p. 428.

MICHAUX, J. L. & SONNET, J. Intérêt du dosage des séromucoïdes dans le diagnostic des hépatopathies tropicales. **[The Role of the Serum Mucoid Level in the Diagnosis of Diseases of the Liver in the Tropics]** *Ann. Soc. Belge de Méd. Trop.* 1959, Aug. 31, v. 39, No. 4, 425–35, 2 figs. [19 refs.]

Serum mucoids is the name increasingly applied to what used to be known as the serum mucoproteins, and the authors have adopted the new nomenclature. These conjugated glycoproteins are found in the plasma and are characterized by their solubility in acid precipitants, namely trichloroacetic, sulphosalicylic, perchloric and phosphotungstic acids, as well as stability to heat and a low isoelectric point (*p*H 2–3). They are supposed to be raised in primary and secondary tumours of the liver, and generally low in parenchymatous liver damage. In obstructive jaundice they are either normal or more often raised.

The authors examined the serum proteins and in particular the serum mucoids of 102 Africans in Léopoldville. They could be subdivided as follows: normal, 28, viral hepatitis, 25, cirrhosis, 16, liver tumour, 16, and amoebic abscess, 17. The serum mucoids form part of the $alpha_1$ fraction of the globulin, and it has occasionally been claimed that their measurement did not show anything which could not just as well and more easily be seen from an assessment of this component. The authors found that the changes in serum mucoids followed the overall changes in the $alpha_1$ globulin, but were much more marked and therefore much more delicate indices of pathological conditions. Thus, taking the mean normal value as 100%, those respectively for $alpha_1$ globulin and serum mucoids were for the hepatitis patients 107 and 87, for the cirrhosis patients 104 and 64, for the hepatoma group 164 and 206, and for the amoebic abscess series 347 and 484.

The results were not all uniform; thus the serum mucoids were raised rather than normal or low in 4 of the 26 patients with hepatitis, and in the 16 hepatoma patients results showed a rise only in 12. The latter finding might be due to the fact that cirrhosis could be established besides hepatoma when the liver biopsy specimens of the 4 patients with normal values were examined. All patients with amoebic abscess showed very high serum mucoid values. None of the patients with cirrhosis was found to have a raised serum mucoid level, in 7 the results were normal, and 9 were below normal. *H. Lehmann*

BROCK, J. F. & GORDON, H. **Ischaemic Heart Disease in African Populations.** *Postgraduate Med. J.* 1959, Apr., v. 35, No. 402, 223–32, 3 figs. [Numerous refs.]

The multiracial population of Africa has provided a fertile field for investigation of inter-racial epidemiology, which in turn may throw light on the aetiology of different diseases and in particular of coronary heart disease.

It is agreed by most workers that clinical manifestations of coronary atherosclerosis are rarely seen in African populations and the failure to diagnose coronary heart disease cannot, it is considered, be due to a different clinical presentation of the disease in Africans. Electrocardiographic studies have confirmed a very low incidence of clinical ischaemic heart disease. In South Africa for example, an analysis of 550 consecutive electrocardiographs showing the classical pattern of cardiac infarction revealed that the racial incidence per 100 electrocardiographs was: White, 81·5; Cape Coloured, 18·1; Bantu, 0·4. The pathological picture of ichaemic heart disease in Bantus differs from that among white people not only in the degree of atherosclerosis but in other respects. Thus ventricular aneurism in white people is usually associated with severe atherosclerosis but in Bantus ventricular aneurisms are associated with syphilis, tuberculosis or mycotic abscesses but never it seems with marked atherosclerosis. Coronary occlusion is a common cause of sudden death in the Europeans but only very seldom in Bantus. Cerebro-vascular accidents are common in Bantus and with these is associated hypertension which is at least as common in them as in white people. The dissociation between the low incidence of ischaemic heart disease and the comparatively greater incidence of hypertension with its attendant atherosclerosis, both cerebral and renal, is important. The pathology of coronary atherosclerosis in Bantus is characterized by a low incidence of severe lesions, and this is accompanied by an extremely low incidence of the clinical manifestations of ischaemic heart disease.

The difference in age structure between Bantus and the white population does not, it is thought, account for the difference in incidence of coronary atherosclerosis for studies have shown that the incidence of the condition, even in Bantu men in the fourth decade of life, was only 3% compared with 32% in a comparable Danish series. Earlier studies indicating that most Bantus have a third primary division of their left coronary artery have not been confirmed by more recent work. Greater excretion of oestrogen by Bantus than by white people has been demonstrated and this may play some part in determining the immunity of Bantus to coronary heart disease. The prevalence of ischaemic heart disease in white races in Africa is comparable to that of similar races elsewhere in the world so that climate cannot be regarded as playing a significant role in protecting Bantus from this disease. In so far as exposure to psychic trauma is concerned, the difference between Bantus and white races is qualitative rather than quantitative and the importance or otherwise of emotional causes for ischaemic heart disease remains, in any case, speculative. The Bantu diet is comparable to that of the European regarding total caloric consumption but there the similarity between the two ends. The qualitative and quantitative difference in fat consumption is the most clearly delineated exogenous factor which may account for the relative immunity of Bantus to ischaemic heart disease. African Bantus have mean serum-cholesterol levels much lower than those of Europeans of the same age and sex but there is a tendency for these levels to rise among urbanized Bantus. In individual Bantus, serum-cholesterol levels can be raised by adding certain "saturated" fats to the diet and this effect can be neutralized by substituting or adding certain "unsaturated" oils. No other dietary manipulations have a comparable effect and apart from these the reasons for the Bantu freedom from ischaemic heart disease remain obscure.

A. W. Woodruff

SENGUPTA, S. N. & CHAKRAVORTY, D. C. **Tropical Eosinophilia and its Treatment with Diethylcarbamazine.** *J. Indian Med. Ass.* 1959, Oct. 1, v. 33, No. 7, 263–9. [18 refs.]

In 1957, 4 patients in Calcutta, suffering from tropical eosinophilia, who were under treatment with arsenic developed arsenical encephalopathy, which proved fatal in 3 of them. This led the authors to carry out a careful therapeutic trial of diethylcarbamazine as a safer alternative form of treatment.

They observe that tropical eosinophilia with pulmonary symptoms appears to be increasing in frequency throughout India, though its incidence remains higher in the coastal regions than in the interior. The criterion of diagnosis adopted was an absolute eosinophil count exceeding 2,000 per cmm., in the absence of any other discoverable cause.

The trial initially included 50 patients of all ages and either sex, though the largest group were aged between 21 and 30 years. 17 patients gave a history of wheezing or asthma of up to 10 years' duration, and 5 had had testicular swelling, in one case associated with an attack of "asthma". In all of them respiratory symptoms were their main complaint. Hepatomegaly was found in 3 patients and testicular swelling in 2; the spleen was enlarged in 1 patient.

The absolute eosinophil count was variable and bore no relationship to the severity of the lung condition. Significant mottling of the lung fields was seen in 8 out of the 24 patients who were examined by X-ray. Stool specimens from 23 patients showed *Ascaris* ova in 2 but no other evidence of helminthiasis was discovered. Microfilariae were not found in the blood of any patient but attempts to demonstrate filarial antibodies were not made.

The dosage of diethylcarbamazine was standardized at 6 mgm. per kgm. body weight daily. The patients were divided into 3 groups, A, B and C, who received the drug orally for 1, 2 and 3 weeks respectively.

In group A 22 patients received treatment but 4 refused a final blood examination, though they were relieved of symptoms. Of the remaining 18, 15 showed marked clinical and haematological improvement, 2 moderate improvement and 1 no improvement, though in each of the last 3 a marked fall in eosinophil count occurred. In group B, out of 22 patients 18 showed marked clinical and haematological improvement, 2 obtained some benefit and 2 no benefit, though in 1 the eosinophil count fell. In group C, containing only 4 patients, 3 showed great improvement and 1 slight improvement only.

In favourable cases the improvement began on about the 3rd day and was usually complete after 1 week. In 9 patients who were unimproved after 1 week's treatment, 2 gained much benefit from the second week's treatment. The fall in the eosinophil count continued for several weeks after the cessation of treatment. Radiological clearing of the pulmonary shadows was complete in most instances though this might require several weeks. In 1 of the 2 instances of testicular enlargement resolution occurred. No toxic effects of Banocide [diethylcarbamazine] at this level of dosage were noted.

The results of this trial appeared very favourable and suggested that 7 days' treatment was sufficient for symptomatic relief to be obtained in most cases.

J. H. Walters

SHANKER, A., BHARGAVA, R. K. & SHRIVASTAVA, B. N. **Diethylcarbamazine in Tropical Pulmonary Eosinophilia.** *Brit. Med. J.* 1960, Jan. 9, 100–103. [20 refs.]

This paper must be read in conjunction with that of NATH and PANDEYA [below]. The present group, in India, have treated 58 cases under somewhat similar conditions, also with diethylcarbamazine. Only those were studied who showed an absolute eosinophil count of 4,000/cmm. or more and whose stools and sputum were negative for any parasitic infection and whose night blood-films were negative for *Wuchereria bancrofti* on 3 consecutive occasions. The clinical picture of dry cough, breathlessness and pulmonary wheeze was present in every case. Routine radioscopy showed prominent reticulation and hilar shadows.

The drug was administered in a daily dose of 8 mgm./kgm. body weight. Most adults received 12 tablets (50 mgm. each) daily in 3 or 4 divided doses: children or underweight adults had 8 or 9 tablets similarly. 50 patients had oral therapy. Patients tolerated the drug well, and, apart from anorexia and nausea, no serious side effects have been encountered, in marked contrast to arsenotherapy. The drug was also tried successfully in 2 arsenic-resistant cases.

4 patients were given 3 to 4 intramuscular injections of 400 mgm. at intervals of 3 to 6 days. All showed symptomatic relief, but the eosinophil count did not return to normal. 4 others received 800 mgm. initially. Only 1 of these 8 was cured.

The conclusion was that when used parenterally the drug was disappointing and caused toxic symptoms in the dose used. The failures afterwards responded to oral treatment. In an experience of 58 cases, the cure rate was 98% and in efficacy the drug is equal to parenteral arsenical therapy. It is suggested that an oral dosage of 8 mgm./kgm. is ideal and that treatment should continue until an adequate haematological response is obtained.

Philip Manson-Bahr

NATH, K. & PANDEYA, S. N. **Diethylcarbamazine Therapy in Tropical Eosinophilia.** *Brit. Med. J.* 1960, Jan. 9, 104–7, 2 figs. [48 refs.]

Organic arsenicals were being used in the treatment of asthma with eosinophilia even before the classical description by FRIMODT-MÖLLER and BARTON in 1940 [this *Bulletin*, 1941, v. 38, 539]. Since the chance discovery of the effectiveness of organic arsenicals in tropical eosinophilia by WEINGARTEN [*ibid.*, 1943, v. 40, 407] many papers have been written about their efficacy. Analysis of the present work proves beyond any possible doubt the efficacy of oral diethylcarbamazine in the treatment of tropical eosinophilia; and 40 out of 44 (91%) patients were completely cured. No aggravation of symptoms was noted and there was no initial rise in the eosinophil count. Both haematological and clinical improvement were maximal within 10 days of therapy and no serious toxic manifestations were encountered even when the treatment was continued for 2 to 4 weeks.

Diethylcarbamazine was equally good in those cases of tropical eosinophilia which had extrapulmonary symptoms and signs in addition to the pulmonary symptoms; and also in those who presented aberrant manifestations of the disease.

In a previous study MISRA *et al.* [*ibid.*, 1960, v. 57, 299] reported 2 cases

that were resistant to arsenotherapy but responded to diethylcarbamazine. One was a medical student who was forced to abandon his studies on account of arsenical exfoliative dermatitis on two occasions, but was immediately cured by diethylcarbamazine. In the present work the reverse is presented in the case of 4 patients resistant to diethylcarbamazine, but who responded to oxophenarsine injections. The extrapulmonary manifestations which yielded to the former drug were pleurisy, lymphadenopathy, abdominal pain, spleno- and hepatomegaly.

Diethylcarbamazine appears to be superior to arsenic because of ease of administration, high cure rate and absence of dangerous toxic reactions. It was given in the form of Hetrazan tablets in daily doses of 8 mgm. per kgm. of body weight. Most adults received 12 50-mgm. tablets a day in three or four divided doses. The treatment was terminated as soon as clinical and haematological response had been obtained. No other drug was used.

Philip Manson-Bahr

ZIGAS, V. & GAJDUSEK, D. C. **Kuru. Clinical, Pathological and Epidemiological Study of a Recently Discovered Acute Progressive Degenerative Disease of the Central Nervous System reaching "Epidemic" Proportions among Natives of the Eastern Highlands of New Guinea.** *Papua & New Guinea Med. J.* Port Moresby. 1959, Feb., v. 3, No. 1, 1–24, 12 figs. (10 on 8 pls.) [37 refs.]

In this paper the clinical and pathological changes found in the first 200 patients with kuru studied by the authors are reviewed and with these readers of this *Bulletin* will already be familiar [this *Bulletin*, 1958, v. 55, 1048], but in addition further observations on the epidemiology and aetiology of the diseases are reported and are based on a study of 600 additional patients.

Since the inauguration in March 1957 of the Kuru Research Project, two-thirds of the population in the area involved have been surveyed and 1% found to be affected. Of these approximately 23½% are pre-adolescent or early adolescent children. Except in the 15–19-years age-groups, the majority of patients are females, but among adults, who comprise over two-thirds of the patients, there is a dramatic predominance of the disease in females. Of those aged 20–29 years, the ratio of male to female patients is 1 to 7·8. The full impact of the disease is upon young adult and middle-aged women and it has been a major factor in producing the current male preponderance in the Fore population.

No history of infective or other disease likely to cause kuru can be elicited from among the Fore population although 5 cases of benign aseptic meningo-encephalitis have been observed in the area. No history of an illness similar to this has, however, been obtained among those affected with kuru.

The similarity of the disease to the neurological manifestations of chronic manganese poisoning and to a lesser extent to those of chronic mercury and zinc poisoning have stimulated an intensive search for possible heavy metal poisoning in the patients. None, however, has been found and nothing in the Fore diet, or body painting, has yet suggested a source of toxicity. An interesting theory which is considered is that excessive consumption of molybdenum, some other trace mineral or sulphate, at levels below those producing direct toxicity might precipitate a relative deficiency state in persons deficient

of some other essential trace metal. Elaboration of this theory would require further knowledge of the interaction and intermediary metabolism of trace metals but in view of the interesting interrelations of molybdenum and sulphates in producing copper deficiency in sheep and cattle, searches along these lines are proceeding. Cases of kuru have now, however, been observed among inhabitants of the kuru region who had lived for considerable periods outside the region. This, and the way in which the disease is uninfluenced by treatment or diet, makes an uncomplicated deficiency seem an unlikely cause.

Concerning genetic aetiology, the family history of patients with kuru reveals that it has been responsible for deaths in the families of well over half of all patients and in the parents of siblings of 46% of patients. Certain families also possess a history of kuru in several siblings who were children of mothers who had died from the disease, and in other families there are examples of the so-called law of anticipation, in which children of an affected parent develop the illness at an earlier age than did the parent. Cases of kuru have also been reported from among tribes who have had extensive marriage contacts with the Fore people. It is concluded that a genetic cause for the disease is most probable [*ibid.*, 1959, v. 56, 565]. *A. W. Woodruff*

WILSON, K., ZIGAS, V. & GAJDUSEK, D. C. **New Tremor Syndromes occurring sporadically in Natives of the Wabeg-Laiagam-Kundep Region of the Western Highlands of Australian New Guinea.** *Lancet.* 1959, Oct. 31, 699–702, 1 map. [16 refs.]

During a survey of the Enga linguistic group of Melanesians living in the Western Highlands of Australian New Guinea the authors encountered 24 tremor syndromes, 3 of which clinically resembled kuru (the "shivers" syndrome of the Fore people of the Eastern Highlands [this *Bulletin*, 1959, v. 56, 565]). The local name for these syndromes was *puriripiram*, which also means "to shiver".

All 3 patients suffered from tremor, ataxia and dysarthria. One, in whom the progress was rapid and fatal within a month, also developed muscular fibrillations. This patient was being treated for leprosy with sulphones. In the other 2 the progress of the syndrome was slower—in one over 8 to 9 years, in the other more than a year.

All 3 patients were males aged between 24 and 35.

The sex incidence and the comparatively slow development in 2 of the cases did not suggest kuru itself but the clinical features were otherwise remarkably similar. In both the cases cited in detail the origin of the syndrome was ascribed to magic or misfortune. The other tremor disorders included congenital cerebellar ataxia, senile tremor, muscular fibrillation, parkinsonism and some which appeared to be psychogenic.

Discussing the implications of these syndromes, the authors point out that some relation to kuru is suggested by the similarities in the clinical pictures. They suggest that if the genetic theories regarding kuru are correct, Melanesians may possess an unstable locus in their chromosomes where mutation could lead to inborn metabolic defects predisposing to central nervous system degenerative diseases.

More information is required before the relation between these new syndromes and kuru can be defined. *B. G. Maegraith*

ZUIDEMA, P. J. **Ulcerative Colitis in an Indonesian.** *Trop. & Geograph. Med.* Amsterdam. 1959, Sept., v. 11, No. 3, 246–52, 1 fig. [17 refs.]

LEVINE, H. B., LIEN, O. G. & MAURER, R. L. **Mortality Enhancing Polypeptide Constituents from** *Pseudomonas pseudomallei*. *J. Immunology*. 1959, Nov., v. 83, No. 5, 468–77, 5 figs. [18 refs.]

An extract obtained by sonic disruption of *Pseudomonas pseudomallei* has been described [LUSBY and LEVINE, this *Bulletin*, 1959, v. 56, 228] which, though non-toxic to mice, enhances the virulence of *Ps. pseudomallei* and *Pasteurella pestis* for mice when injected intraperitoneally along with the organisms. This paper describes the chemical purification of the material.

The most active fraction was found to be a water-soluble heat-stable polypeptide. This fraction did not kill mice by itself in a dose of 1,000 μgm. but a dose of 30 μgm. increased from 20% to 100% the mortality rate of mice injected with 1,000 *Ps. pseudomallei*. The polypeptide fraction was prepared by disrupting autoclaved organisms by sonic energy, dialysis, centrifugation, and removal of lipids by extraction with chloroform and methanol. The evidence that the active fraction consisted of peptides was its nitrogen and protein content, its lack of detectable carbohydrate, and the close correspondence of the total nitrogen in the fraction with the sum of the calculated nitrogen contents of the amino acids and ammonia found by analysis to constitute the fraction. Its activity was not affected by treatment with trypsin. By ultracentrifugation the active polypeptide was separable into two fractions of different particle size but of similar composition and virulence-enhancing activity. These appeared to be related peptide chains of different weights.

Another fraction with virulence-enhancing activity was isolated. This was a protein with an amino-acid structure similar to that of the soluble polypeptides. The polypeptides and the protein together comprised about 0·6 of the dry weight of the organism. *I. B. R. Duncan*

PARASITOLOGY: GENERAL

MANSOER, T. A. Een effectieve concentratiemethode voor het opsporen van protozoaire darminfecties. [**An Effective Concentration Method for the Detection of Intestinal Protozoal Infections**] [Thesis.] 65 pp., 6 figs. [36 refs.] English summary. 1959. Leiden: Laboratorium voor Parasitologie, Rijksuniversiteit.

This thesis is devoted to a critical evaluation of various concentration methods used for the detection of intestinal protozoa in stools, and a detailed account is given of a new technique developed by the author himself. A comparison of Richie's MGL [Medical General Laboratory] method, De Rivas' and Maldonado's methods, and Laarman's modification of Schüffner's method, revealed the superiority of the last-named, which was further improved by the author. The procedure, which was found to be the most satisfactory, is as follows: (1) the presence of cysts is determined by examination of an eosin

preparation of the faeces; (2) the stool is ground in a mortar with water; (3) a sample, about the size of a pea, is mixed with about 3 ml. of water in a centrifuge tube, and (4) simplified Bayer's fluid added to 2 cm. below the brim, after which the mixture is shaken; (5) about 0·5–1 cm. of the space is filled with benzene, the mixture is shaken vigorously for 1 minute; then (6) the tube is topped with more Bayer's fluid and (7) is allowed to stand until no more particles rise to the surface (about 5 minutes); (8) the floating particles are flicked off (in order to obtain a clear fluid, items 5–8 are repeated); (9) the tube is centrifuged for 3–5 minutes at 2,500 r.p.m., then (10) the fluid is decanted and the sediment is examined microscopically, after addition of Lugol's solution or carbol thionin.

Estimates of the numbers of cysts concentrated by various methods showed that the technique described above produced the best results, the optimum *p*H being 3·82. *C. A. Hoare*

ALICNA, A. D. & FADELL, E. J. **Advantage of Purgation in Recovery of Intestinal Parasites or their Eggs.** *Amer. J. Clin. Path.* 1959, Feb., v. 31, No. 2, 139–41.

Various methods for the detection of intestinal parasites were tried out in soldiers returning to the U.S.A. from Korea and Puerto Rico. A saline purge was given early in the morning, and three separate faecal samples were subsequently collected. Each was emulsified in normal saline, strained through cheese cloth, centrifuged twice at 2,500 r.p.m. and finally subjected to various concentration procedures (zinc sulphate flotation, formalin-ether sedimentation and acid-ether concentration). Purgation improved the chances of finding organisms, *e.g. Entamoeba histolytica* was found in 63 instances by the ordinary method, but 72 times after the use of a saline purge. The formalin-ether sedimentation procedure proved best for protozoa, acid-ether centrifugation for helminth eggs and the Scotch tape method for *Enterobius vermicularis*. *P. C. C. Garnham*

RODRIGUES DA SILVA, J., ESCOSTEGUY, J. A., ERTHAL, A., DE PAOLA, D. & DIAS, L. B. Biopsia duodenal e jejunal em algumas parasitoses intestinais. **[Duodenal and Jejunal Biopsy in Some Intestinal Parasitoses]** *Bol. Centro Estudos Hosp. Servidores Estado.* Rio de Janeiro. 1959, Sept., v. 11, No. 9, 502–10, 3 figs. English summary.

This is a report of the findings in 38 patients in a Brazilian hospital examined by Shiner's intestinal sound. Because of difficulties encountered the chief of which was getting the sound through the pylorus, the authors were successful in obtaining biopsies in only 22 patients. A further disadvantage was that the examination had to be performed under radiological control with possible risk to the patient and the operator, so the length of the examination was never more than 1 hour, though Shiner suggests 1½ to 2 hours. No complications occurred. Parasites were looked for at the same time as the biopsy was taken, which in 12 patients was from the duodenum, and in 10 from the jejunum.

The most frequent finding was infiltration of the mucosa with lymphocytes and plasma cells, though in 10 patients there were eosinophils also. In only 3 was the histological picture normal. In 1 instance an ovum of *Strongyloides stercoralis* was seen at the base of a crypt.

Schistosoma mansoni, *Ascaris lumbricoides*, and *S. stercoralis* were found alone in each of 3 patients, and in the remainder one or other of these was combined with *Necator* or *Giardia*. 10 patients had an *S. mansoni* infection, 1 having a schistosome granuloma also.

The authors consider that the sound will be useful in studying the pathology of the upper part of the small intestine. *W. K. Dunscombe*

SILVA, M. E., COLOMBO BARRETTO, A. & DE SOUZA LOPES, J. A. **Effect of Acti-Dione on Some Protozoa.** *Bol. Fundação Gonçalo Moniz.* Bahia. 1958, July, No. 12, 7–13. [10 refs.]

The discovery of Acti-dione, an antibiotic from *Streptomyces griseus* was reported by WHIFFEN *et al.* [*J. Bacteriology*, 1946, v. 52, 610; *Bull. Hyg.*, 1947, v. 22, (208)]. It was found to lack activity against bacteria but was active against a number of saprophytic fungi as well as against a few pathogenic types. It was found of use in isolation of bacteria or of certain types of fungi free from saprophytic types. The present authors have now tested it in various concentrations against pathogenic protozoa in culture, including *Entamoeba histolytica* and *E. moshkovskii*, *Leishmania brasiliensis*, *L. donovani* and *Trypanosoma cruzi*. The substance was added in distilled water to these organisms maintained in cultures at appropriate temperatures in the presence of penicillin and streptomycin.

The growth of both species of amoeba and leishmania was completely inhibited. *T. cruzi* was the only organism that survived but its development was hindered. *J. D. Fulton*

JIMÉNEZ-QUIRÓS, O. & ZAMORA, L. M. Parasitosis intestinal en el universitario costarricense. III. Terapéutica. [**Intestinal Parasitic Infection in University Students in Costa Rica. III. Treatment**] *Rev. Biologia Trop.* San José, Costa Rica. 1959, July, v. 7, No. 1, 95–106. [13 refs.] English summary (5 lines).

The authors have already reported the results of surveys on the incidence and clinical features of intestinal parasitic infections in freshmen of the University of Costa Rica [this *Bulletin*, 1959, v. 56, 170, 830]. They now record a study on 1,000 male and 1,000 female students in which a battery of anthelmintic and anti-protozoal drugs was tried in suitable groups of these students. All the common intestinal parasites are included in the study, but particular attention was paid to amoebae and *Trichuris* which were the parasites most frequently encountered. There is some reference to the literature on the treatment of intestinal parasitism.

9 anthelmintic and 9 anti-protozoal agents were studied. These included those in common use and some of the newer therapeutic substances. The dosage, use and efficacy of each is briefly discussed. In respect of success, tolerance and cost, the treatments recommended for each infection or combination of infections are listed in order of preference.

Many of the authors' conclusions are in accord with common experience, but certain points of special interest are that dithiazanine iodide was found the most satisfactory drug for trichuriasis and enterobiasis; Diphenthane-70

proved most effective for *Hymenolepis nana* infections [see above, p. 389] and was a second preference for taeniasis; but the most satisfactory for *Taenia* infections was β (4-hydroxy-3, 5-diiodophenyl)-α-phenyl-propionic acid; N-(β-oxyethyl)-N-(p-phenoxy-(4′ nitro)-benzyl)-dichloroacetamide [Mebinol: see amoebiasis section above] was the most effective for intestinal amoebiasis.

H. J. O'D. Burke-Gaffney

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

SENEVET, G., ANDARELLI, L. & CLASTRIER, J. Présence dans le Sahara français de *Anopheles sergenti* sb. sp. *mac mahoni* et de *A. rhodesiensis* var. *rupicolus*. [**The Presence of** *Anopheles sergenti* **sb. sp.** *macmahoni* **and** *A. rhodesiensis* **var.** *rupicolus* **in French Sahara**] *Arch. Inst. Pasteur d'Algérie*. 1959, Sept., v. 37, No. 3, 462–73, 2 figs. [17 refs.]

HUANG, Y. S., CHEN, K. K. & LIU, L. B. [**Studies on the Feeding Habits of Mosquitoes in Foochow**] *Acta Microbiologica Sinica*. 1959, Nov., v. 7, No. 3, 209–16. [15 refs.] [In Chinese.] English summary.

In 1956–1957 tests of blood meals were made on 2,779 specimens of 14 species of mosquitoes caught in various resting places in Foochow. The commonest species were *Anopheles sinensis*, *Culex fatigans*, *C. tritaeniorhynchus*, *Armigeres obturbans*, *Anopheles minimus* and *A. jeyporiensis* var. *candidiensis*. Most of the mosquitoes were zoophilic, with a preference for cattle, but some were anthropophilic and *C. fatigans* was predominately so. There were no topographical preferences and choice of feeding seemed to be determined by the relative proportion of human habitations and cattle sheds in the vicinity.

A. sinensis, though usually preferring cattle blood, would feed on man when the opportunity arose. The importance of this is stressed since the species is the chief vector of *Wuchereria malayi* in hilly areas and of malaria parasites in rice fields.

Although *A. minimus* and *A. jeyporiensis* var. *candidiensis* (important vectors of malaria in hilly areas in South China) have been shown by others to have a preference for human blood this was not confirmed by the authors; however, in the present studies few specimens were caught and these were mostly from cattle sheds. *C. tritaeniorhynchus* was largely zoophilic.

The food preferences of *C. fatigans* were studied for the first time in the area: the species was shown to be anthropophilic irrespective of where it was caught. This species is widely distributed in urban areas throughout the year, is the chief vector of *W. bancrofti* on the coast of Fukien Province, and has been shown to harbour a strain of Japanese B virus in Foochow. Its medical importance is thus very considerable and calls for vigorous control measures where possible.

H. J. O'D. Burke-Gaffney

See also p. 340, DAVIS *et al.*, **Exploratory Studies on Gamma Radiation for the Sterilization and Control of** *Anopheles quadrimaculatus*.

STOBBART, R. H. **Studies on the Exchange and Regulation of Sodium in the Larva of *Aedes aegypti* (L.). I. The Steady-State Exchange.** *J. Exper. Biol.* 1959, Dec., v. 36, No. 4, 641–53, 5 figs. [16 refs.]

GILLETT, J. D. **Control of Hatching in the Prediapause Eggs of *Aedes* Mosquitoes.** *Nature*. 1959, Nov. 21, v. 184, 1621–3. [10 refs.]

Eggs of *Aëdes aegypti* enter into a state of diapause after reaching embryonic maturity and, even in batches of the same age kept submerged in water, hatchings may occur from time to time over months. This delayed hatching, or diapause, is controlled genetically. Most of numerous stimuli which break diapause and so induce simultaneous hatching involve lowering the amount of dissolved oxygen in the water. The present article considers further the factors which inhibit hatching during the few days of the prediapause period.

In one strain of *Aëdes aegypti* reported upon, diapause set in 5 days after eggs were laid. The proportion hatching on the third or fourth day (pre-diapause hatchings) varied from nil to 76% in different batches, no batch hatching out completely in the prediapause period. Some eggs always entered diapause. Experiments are described which show that initial hatchings deterred subsequent hatchings so that at least some eggs entered their fifth day and the state of diapause which then supervened. The experiments are well conceived regarding controls and involve large numbers of eggs in replicate tests. Results, which are statistically treated, are set out in two tables. The nature of the inhibiting factor created by initial hatchings and the presence of the emerged larvae is not known; *p*H of the medium appears not to be concerned.

It is emphasized that these findings concern inhibition of hatching of eggs before diapause sets in. This is not at variance with the earlier findings that the presence of larvae may stimulate eggs in a state of diapause to hatch [this *Bulletin*, 1923, v. 20, 460; 1927, v. 24, 941]. *D. S. Bertram*

FAY, R W. **Toxic Effects of Boron Trioxide against Immature Stages of *Aedes aegypti, Anopheles quadrimaculatus,* and *Culex quinquefasciatus*.** *J. Econom. Entom.* 1959, Oct., v. 52, No. 5, 1027–8.

Metaboric acid, at concentrations of 2,000 to 8,000 p.p.m., has been found to cause 100% mortality, after 24–48 hours, in first and second stage larvae of *Culex fatigans*, *Aëdes aegypti* and *Anopheles quadrimaculatus*. Third stage larvae and pupae were less susceptible. The addition of humus to the water did not reduce the toxicity of the acid. *B. R. Laurence*

WOOD, R. J. **Insecticide Resistance in Mosquitoes.** *Ann. Applied Biol.* 1959, Sept., v. 47, No. 3, 620–25. [27 refs.]

In summarizing the facts about insecticide resistance in mosquitoes, the author lists 13 species of anophelines and 10 culicines in which this has been reported. The genetical and biochemical evidence is briefly reviewed. One problem, for which there are few firm data, is whether selection for resistance simultaneously preserves other genetic characters. The author's own work on this point concerns DDT-resistant strains of *Aëdes aegypti* from the West Indies

[see BROWN and PERRY, this *Bulletin*, 1956, v. 53, 1492; COKER, *ibid.*, 1959, v. 56, 888; QUTUBUDDIN, *ibid.*, 1959, v. 56, 988].

One relevant observation [by KELLETT and OMARDEEN, *ibid.*, 1958, v. 55, 27, 391] was a report of unusually high incidence of tree hole breeding of *Aëdes aegypti* in Trinidad, where resistance was first reported, as compared with other parts of the New World. To investigate this suggestive report, experiments were conducted in London on two DDT-resistant strains (from Trinidad and Haiti) and two susceptible strains (long colonized in the laboratory in U.S.A. and London respectively). The most convenient oviposition reaction of the mosquito for laboratory study was its reaction to light, it being considered that a tree-hole breeder would be more inclined to lay in the dark. The tests were done in 18-inch cube cages almost divided into two by a partition, providing a choice between a light and dark half. A large number of tests was performed with each strain in which eggs were collected from both sides. The overall totals gave the following percentages of eggs laid in the dark: Trinidad resistant 63; Haiti resistant 50; American susceptible 17; London susceptible 30. Several of these differences were significant and it seems clear that they represent real biological differences between the strains.

Although dark-laying seems to be correlated with resistance, the author remarks "Definite conclusions . . . cannot be drawn at this stage". [Later work justified this caution, as another susceptible strain, from West Africa, was found to have a dark-laying tendency. Thus, although this character is clearly a variable in different strains its exact relevance to resistance is not yet clear.]

J. R. Busvine

HAMON, J., GRJEBINE, A., COZ, J., KLEIN, J. M. & MICHEL, R. Observations sur le niveau de sensibilité aux insecticides de quelques moustiques du littoral méditerranéen. Présence d'une souche de *Culex pipiens* L. résistante au dieldrin. [**Observations on the Level of Susceptibility to Insecticides of some Mosquitoes of the Mediterranean Coast. The Presence of a Strain of** *Culex pipiens* **Resistant to Dieldrin**] *Bull. Soc. Path. Exot.* 1959, Mar.–Apr., v. 52, No. 2, 199–208. [Numerous refs.]

Fourth stage larvae of two strains of *Culex pipiens pipiens* were tested under controlled conditions by techniques recommended by WHO. The strains originated from two towns, Narbonne and Pézenas, on the French Mediterranean coast. Narbonne and its environs had been treated with DDT and BHC for 5 years. Insecticides had not been widely used in Pézenas. The Narbonne strain was found to be highly resistant (200–450 times) to dieldrin when compared with the Pézenas strain. However, it was only 4–7 times as resistant to DDT. Malathion was less effective than DDT on the Pézenas larvae and almost as active as DDT with the Narbonne strain. Tests of adults from Narbonne with DDT and dieldrin resulted in negligible kills at the highest concentrations used.

Wild-caught, hibernating *Anopheles maculipennis* from Salin-de-Badon were tested with the WHO adult test kit. These mosquitoes proved to be susceptible to DDT and dieldrin, the median lethal concentrations being 1·5% and 0·86% respectively.

In addition, measurements on the susceptibility levels of third stage larvae of *Aëdes caspius*, from Salin-de-Badon, indicated that this species was very

susceptible to DDT and dieldrin and "very insensitive" to malathion. [However, the LC50 for the latter is given as 0·053 p.p.m. which is of the same order as the LC50 of malathion obtained for *C. pipiens pipiens* from Narbonne.]

B. C. Fine

CERF, J. & LEBRUN, A. Résistance de *Culex pipiens fatigans* aux hydrocarbures chlorés à Léopoldville (Congo belge). [**Resistance of** *Culex p. fatigans* **to Chlorinated Hydrocarbons in Léopoldville, Belgian Congo**] *Bull. World Health Organization.* Geneva. 1959, v. 20, No. 5, 994–1001.

DDT and BHC have both been used in antimalarial campaigns in Léopoldville. *Culex fatigans* has developed resistance to these insecticides and also to dieldrin, which has not been widely used in the district. It is suggested that there is a cross resistance to BHC and dieldrin. Resistance to BHC may be a recent development as there is evidence that the population of *C. fatigans* is made up of resistant and non-resistant individuals.

The authors also consider alternative methods of control and conclude from experiments that organophosphorus insecticides, Thanite or pyrethrins, distributed as aerosols are most effective against both larvae and adults, but that chlorinated hydrocarbons distributed in the same way are not.

B. R. Laurence

CLASTRIER, J. Notes sur les cératopogonidés. VIII. Cératopogonidés de l'Ile de la Réunion. [**Notes on Ceratopogonids. VIII. Ceratopogonids of Réunion**] *Arch. Inst. Pasteur d'Algérie.* 1959, Sept., v. 37, No. 3, 412–46, 26 figs. [17 refs.]

LEVINSON, Z. H. & BERGMANN, E. D. **Vitamin Deficiencies in the Housefly produced by Antivitamins.** *J. Insect Physiol.* London. 1959, Oct., v. 3, No. 3, 293–305, 7 figs. (6 on 2 pls.) [32 refs.]

VAN ASPEREN, K. **Distribution and Substrate Specificity of Esterases in the Housefly,** *Musca domestica* **L.** *J. Insect Physiol.* London. 1959, Oct., v. 3, No. 3, 306–22. [30 refs.]

KEIDING, J. **House-Fly Control and Resistance to Insecticides on Danish Farms.** *Ann. Applied Biol.* 1959, Sept., v. 47, No. 3, 612–18, 1 fig. [10 refs.]

Most of the 200,000 Danish farms suffer from prolific fly breeding in heaps of pig and calf dung and a very large number have resorted to insecticides for fly control. As a result, insecticide resistance in house-flies has occurred extensively and at high levels, leading to changes from one insecticide to another. DDT, introduced in 1945, was widely used up to 1948, when resistance rendered it virtually ineffective so that it was scarcely used after 1949. Gamma BHC, introduced in 1948, provoked some resistance in 1949 and by 1950 its wide use ceased because of resistance. The same sequence followed with chlordane, introduced in 1949 and abandoned in 1952–3.

The organophosphorus insecticides, parathion and diazinon, were introduced in 1951–1952. Parathion was widely used on treated strips of cloth [WICHMAND, this *Bulletin*, 1954, v. 51, 322]; diazinon was used as a residual spray, though not so widely. By 1955, organophosphorus resistance was reported to these two compounds and also to certain other organo-phosphorus insecticides [KEIDING, *ibid.*, 1956, v. 53, 1394].

From 1951 onwards, a small to moderate amount of control was done by pyrethrum sprays, though this is more troublesome and expensive. Only low level resistance to pyrethrins has developed in Denmark. Another method of fly control has been the use of thiourea on dung to prevent pupation. This was tried in 1958; it is fairly effective, but troublesome.

Study of the progress of DDT-resistance and BHC-resistance in the absence of selection was made by investigating the flies on large numbers of farms, 3 to 6 years after these compounds had been withdrawn. The results showed that appreciable proportions of the wild fly populations still retained the resistant genes, mainly in the heterozygous condition. This appears to be a fairly stable situation and would preclude the effective reintroduction of the insecticides concerned. *J. R. Busvine*

MUELLER, H. L. **Further Experiences with Severe, Allergic Reactions to Insect Stings.** *New England J. of Med.* 1959, Aug. 20, v. 261, No. 8, 374–7. [13 refs.]

Severe reactions to insect stings occur more commonly than is generally supposed and may account for some cases of unexplained sudden death. Identification of the insect responsible proved impracticable and serial intra-cutaneous tests were done with whole insect extracts of paper wasp, hornet, yellow jacket and mixed honeybee and bumblebee.

Of the 84 patients in the study, 75% had a family history of allergy and 89% showed a multiple skin sensitivity. These patients showed more severe reactions than those who had no family or personal history of other allergy. In all patients who had a systemic reaction to a sting by these insects, a mixed whole insect extract of bee, wasp, hornet and yellow jacket was advised.

The first positive test to appear during serial testing was used as the starting point for the initial dose in treatment. The dose was then gradually raised to a maintenance dose of 0·2 to 0·3 of a 1:100 dilution.

If testing was not performed an initial dose of 0·05 ml. of a dilution of 1:100,000,000 was advised. 76 patients were tested and 40% of them had subsequent stings. With one exception, none had systemic reactions when stung while on a maintenance dose of 0·15 ml. or more of a 1:100 dilution of mixed extract or after completing three years of treatment.

H. T. H. Wilson

See also p. 367, BRYGOO & RAJENISON, Présence de *Centetipsylla madagascariensis* (Rothschild) 1900 sur *Rattus rattus* de Tananarive. Observations sur les variations de la faune pulicidienne des rats de Tananarive. [**Observations on the Flea Fauna of Rats in Tananarive. Presence of** *Centetipsylla madagascariensis* **on** *Rattus rattus* **in Tananarive**]

See also p. 359, NEAL & LIPOVSKY, **Techniques for rearing the Chigger Mite,** *Trombicula akamushi* **(Brumpt).**

SHEPARD, H. H. **Methods of Testing Chemicals on Insects. Vol. I.**

This book was reviewed on p. 320.

JUNG, H. F. **A New Phosphoric Ester Residual Insecticide with a Low Order of Toxicity.** *Bull. World Health Organization.* Geneva. 1959, v. 21, No. 2, 215–21, 2 figs.

The compound referred to is O,O-dimethyl-O,4-(methylmercapto)-3-methylphenylthiophosphate, known as Baytex. This paper gives details of its chemical and physical nature and toxicity to vertebrates. The acute oral LD50 for rats is given as 200 to 450 mgm./kgm., which is about the same as that of DDT. Laboratory tests are described in which various insects were confined on different surfaces, carrying Baytex residues, at various periods after treatment. The results show that appreciable insecticidal action remains after 4 months. [The tests, being artificial, do not prove whether the residues would be effective in practice after this time. See, however, CERF and LEBRUN and COVA GARCÍA and SUTIL, this *Bulletin*, 1960, v. 57, 80, 85.] *J. R. Busvine*

KHAJURIA, H. **Catalogue of Mammals in the Zoological Survey of India. IV. Primates: Prosimii, Tarsioidea and Platyrrhine.** *Rec. Indian Mus.* 1955, Mar.–June, v. 53, Pts. 1/2, 223–50, 4 figs. on pl. [32 refs.]

MISCELLANEOUS PAPERS

MUAZZAM, M. G. & KHALEQUE, K. A. **Effects of Fasting in Ramadhan.** *J. Trop. Med. & Hyg.* 1959, Dec., v. 62, No. 12, 292–4, 1 fig.

During the ninth lunar month of the Mohammedan year adult Muslims (men over 15 and girls over 12 years of age) neither eat nor drink from about 1½ hours before sunrise until sunset. [Since the Mohammedan year consists of 12 lunar months, the date on which the fast begins moves steadily forward: at present it falls in the early summer.] The duration of the fast each day varies from 12 to 19 hours, depending on the geographical position and time of year. Those who are ill or are on a journey [or at a war] may claim exemption.

There is, in fact, no reduction in overall fluid and calorie intake during this period, and the nightly feasting ensures that rather more protein and carbohydrate are consumed than usual.

The authors carried out a detailed investigation on the effects of Ramadhan on a group of 13 volunteers, comprising 10 males whose ages ranged from 22 to 69 years, and 3 females aged 17, 27 and 40 years, one of whom was 6 months pregnant. A 27-year-old male who did not fast served as a control. Base line estimations were made one week before the start of Ramadhan, and a final survey one month after its termination. The tests were repeated after the

first day of fasting, on the 10th day and on the last day. The necessary specimens for the initial and final survey were obtained in the early morning, and during the fast just after sundown.

During the fast all but 2 of the subjects lost weight up to a maximum of 7 lb.: in half of them this was made up within 4 weeks. The pregnant woman continued to gain weight.

There was no significant variation in pulse rate, body temperature, haemoglobin concentration and blood pressure, or in basal metabolic rate. There was a significant fall in the level of fasting blood sugar in all subjects, but no alteration in the glucose tolerance curve was found in the 4 in whom this estimation was made before and at the end of the fast. The blood urea, alkali reserve, plasma cholesterol, chloride and sodium remained within normal limits. Liver and renal function remained unimpaired. Interest and efficiency were however noticeably diminished.

The authors conclude that Ramadhan has no deleterious physical effects on healthy subjects. *J. H. Walters*

REPORTS AND SURVEYS

BLACK, R. H. **The Health of Patrol Officers in the Territory of Papua and New Guinea.** *Med. J. Australia.* 1959, Sept. 26, v. 2, No. 13, 428–35.

In this article the author strives to assess the physical and mental health of European patrol officers in whose hands lie the actual policing and administration of the vast, undeveloped forest tracts of New Guinea and Papua. 36 patrol officers, out of a total strength of 141, who were attending a course at the School of Pacific Administration at Sydney, were examined and investigated, and in addition were requested to fill in a questionnaire relating to their mental health.

During a period of between 2 and 4 years' duty only 2 out of the 36 officers had escaped physical illness. Diarrhoea and dysentery had been common, yet only 3 still harboured cysts of *Entamoeba histolytica* when surveyed. Half the group stated that they had suffered from attacks of malaria, the number of attacks increasing with the length of service; those who had 5 years' service had each had on the average 3 bouts of clinical malaria. Although drug prophylaxis was laid down by regulation, ⅔ of the men admitted irregularity of dosage. Chloroquine was the drug favoured by the most experienced officers, the choice lying between this drug, proguanil and amodiaquine (the next favourite). Even among those who stated that their drug prophylaxis had been regular, 3 out of 12 had had clinical malaria, while of those who had been more lax, 15 out of 24 had suffered attacks. Among a group of 21 officers who remained in Sydney for 11 months, 11 (55%) developed relapses of *P. vivax* malaria, half of them within 3–4 months after cessation of drug suppression. A [? blanket] treatment with primaquine 22·5 mgm. daily for 14 days subsequently reduced the incidence of late relapses to 8%, though 15 mgm. daily proved insufficient in that relapses followed in 22% of officers.

Skin diseases had affected 11 of the group, the common types being tropical

ulcer (3 instances), tinea (6) and acne (3). Injuries were common but all were the result of sport or road accidents.

Infective hepatitis was apparently widely distributed in these territories from 1955 to 1957 and 5 officers acquired the disease. Judging from this high incidence and from the results of stool examinations, 31 out of the 36 had been exposed to faecal contamination of their food and drink. Hookworm infection was not found, most officers having been careful not to go barefoot.

A serological survey showed an absence of antibodies to the 10 locally prevalent strains of leptospires, and to the virus of Murray Valley encephalitis, and no specimen showed a significant titre in the Widal test. However, 3 officers showed positive Weil-Felix reactions, at a titre of 1/125, 2 to *Proteus OXK* and 1 to *OX2*. The significance of these results is uncertain, since a rapid decline in titre occurs during convalescence from any of the rickettsioses.

The mean haemoglobin concentration of 29 officers shortly after their return to Australia was 15·9 mgm. per 100 ml. To judge from their weight increment after homecoming, loss of weight had been common during service and was most marked in those officers who were exposed to the hazards and stresses of life in the more remote stations.

The analysis of the answers received to the mental health questionnaire is complex and only the bare conclusions can be given here. Those who had joined the service as their chosen career, and the escapists, had found satisfaction in their work; the idealists were frustrated. Loneliness was most manifest in the unsatisfied and those who had unsatisfactory relationships with the local population. Those coming from the higher social strata were less susceptible to this than those of humbler origin. A greater addiction to alcohol provided clear evidence of maladjustment to this highly unusual mode of life. There was, however, a tendency for an officer to settle down in the service as time brought a greater responsibility, and with it increasing satisfaction. Resignation was most common in the first tour of duty; a few more chronically disaffected resigned during their first period of leave.

The author stresses the desirability of improving the methods of selection of recruits [presumably by the adoption of some course of tests such as those evolved by the services for officer-selection during World War II]. An appreciable *esprit-de-corps* does not yet seem to have developed but the influence of the personality of individual senior officers is clearly reflected in the outlook and performance of their subordinates. *J. H. Walters*

BOOK REVIEWS

SCHNEIDER, J. **Les maladies tropicales dans la pratique médicale en France.** [Tropical Diseases in Medical Practice in France] *Synthèses Cliniques. Suppl. xx des Monographies Méd. et Scient.* Paris. 1957, Dec., No. 70, 68 pp.

The author gives a very clear account of tropical conditions as seen in Europe in patients who have acquired them abroad. The booklet is meant for the practitioner and is therefore concerned largely with clinical aspects,

diagnosis and treatment. Aetiological information is restricted to a minimum; nevertheless, in each section the mode of transmission is covered, especially the possibility of transmission in metropolitan France, and the geographical distribution of the diseases in question is described. Throughout, the importance of the geographical history of the patient in diagnosis is very strongly emphasized.

The author points out that correct diagnosis is vital in some instances, for example, *Plasmodium falciparum* malaria, and often depends on the doctor's thinking of it. Knowledge of the recent geographical environment of the patient may give the basic clue to the diagnosis. Here the rôle of the doctor in obtaining a good history from the patient or his associates is fundamental. The extraction of the history of a stay in a tropical area, no matter for how short a time or how long ago, will often save the doctor errors and enable him to obtain early diagnostic help from the right laboratories. With modern therapy right diagnosis leads as a rule to relief or cure. Missed diagnosis may be fatal.

The principal tropical diseases are dealt with in 8 chapters and the ninth chapter deals shortly with prevention.

This is an admirable summary of the situation, written lucidly and with great authority. *B. G. Maegraith*

BELDING, David L. [M.D.] **Basic Clinical Parasitology.** pp. vii + 469, 118 figs. 1958. New York: Appleton-Century-Crofts, Inc. [76s.]

This book, which is written for the medical student and the busy medical practitioner, achieves very well its object, which is to strike a medium between the small textbooks of parasitology and the larger, more detailed ones, such as the same author's well-known *Textbook of Clinical Parasitology*, from which many illustrations and much basic material have been taken. Condensation has been achieved by giving most of the space to the common, cosmopolitan parasites and by treating the others more briefly, by avoiding discussion of controversies and restricting discussion of the morphology and biology of the parasites to features that are important for diagnosis and control. The text is further relieved by excellent figures, all in black and white, and by the use of tables and charts which economize space. The book, the author tells us, includes advances in parasitology up to the year of its publication and special attention has been given to important recent advances in our knowledge of malaria, toxoplasmosis and schistosomiasis.

It is not to be expected that, in a book which covers so wide a field, there are not statements here and there which could be criticized, for in any textbook such statements can be found. It is more important for the potential reader to know that here he will find an account of human parasitology which can be recommended and to know also an outline of what the book contains. Opening with a general chapter on the nature of parasitism, the modes by which parasites are transmitted, immunity to them, the symptoms they cause and the diagnosis, treatment and control of infections with them, the book deals successively with the most important protozoa, nematodes, cestodes, trematodes, insects and arachnids (ticks and mites) which directly or indirectly injure man or his affairs. A chapter then follows on the diagnosis of parasitic diseases, in which the author gives only the technical methods " commonly used by students

or laboratory technicians", though detailed references are also given to the literature on special methods. In the last, and perhaps the least satisfactory, chapter, the author deals with treatment, the drugs used and with insecticides and repellents.

Compact, well printed and convenient to handle, the book thus gives so much information that it will be useful, not only to medical workers, but also to biologists and veterinarians—and, indeed, to anyone else who is interested in the parasites of man. Its illustrations alone, so clearly drawn and so well reproduced by the printer, would justify the purchase of the book.

G. Lapage

NAGATY, H. F. [D.Sc., M.Sc., Ph.D.] **Practical Parasitology.** 2nd Edition. pp. viii + 175, 14 figs. 1959. Cairo: Egyptian Central Press.

This book is intended for the use of students of both veterinary and medical parasitology. It runs to some 180 pages, of which about 100 consist of text, diagrams and drawings, while the remainder are left blank (printed pages and blanks usually alternating), in order that the student may make his own drawings from the specimens set out for examination in the laboratory.

The following passage (which faces a blank page) is quoted from the section devoted to protozoology, and may be taken as representative of the type and extent of the information imparted throughout the book.

"Group V

TRYPANOSOMA CRUZI

Specimen 380—Blood smear L.p., H.p. & O.i.

Size: On the average 20μ long.

The posterior end of the body is sharp, pointed, almost wedge-shaped and the parabasal body is oval or egg-shaped and very conspicuous. The body tends to adopt a curved shape like a letter C. The nucleus is centrally placed and the flagellum becomes free at the anterior end. Two types are known in the blood, one broader and the other narrower.

Specimen 381—Section in the heart muscle L.p., H.p. & O.i.

This section shows spaces in the muscle fibres completely filled with the leishmania-like forms of the parasite.

TRYPANOSOMA LEWISI

Specimen 382—Blood smear L.p., H.p. & O.i.

Size: On the average 25μ long.

The posterior end of the body is sharply pointed, while the body itself tends to be curved. The nucleus is situated anteriorly. The parabasal body is large and rod-shaped, and the lateral flagellum passes down fairly close to the body to become free at the anterior end.

TRYPANOSOMA THEILERI

Specimen 383—Blood smear L.p., H.p. & O.i.

Size: 70 × 4–5μ.

The trypanosome resembles somewhat *T. lewisi* but is much longer and the nucleus is band like."

Elsewhere in the text it is explained that the symbols "L.p., H.p. & O.i." indicate that the student should commence his examination with the low power

of the microscope, continue with the high dry and complete his examination with the oil immersion—a suggestion well worth copying into other manuals.

So far as the reviewer can discover, no other reference is made to these parasites, so that the student is not told whether he is dealing with creatures of medical or of veterinary importance; while in the section devoted to entomology, although brief descriptions are given of bugs, fleas and tabanids, no mention is made of the part which they play in the transmission of trypanosomiasis. As a result of these and of similar omissions, which occur also in the helminthology section, the student is deprived of all but a modicum of information concerning the life-cycles, habits and modes of conveyance of many of the more important parasites affecting man and his domestic stock.

In the preface it is stated that "This manual covers the courses of Medical and Veterinary Parasitology and to a great extent also post-graduate courses of the Diploma of Tropical Medicine and Hygiene and other diplomas and degrees in which Parasitology is taught as part of the curricula". No doubt this handbook is a valuable guide for students attending certain elementary courses of instruction in medical or veterinary parasitology, but the reviewer cannot agree that it contains the information required by students at a more advanced level.

R. M. Gordon

WATSON, J. M. [D.Sc., A.R.C.S.] **Medical Helminthology.** pp. xi + 487, 62 figs. 1960. London: Baillière Tindall & Cox, Ltd., 7 & 8, Henrietta Street, Covent Garden, W.C.2. [84s.]

This book, its author explains in a thoughtful Preface, is the outcome of lectures delivered at the American University of Beirut and no doubt it embodies his long experience as a helminthologist and as a teacher in Iraq and elsewhere. It deals with a subject which, as he rightly observes, has received a great deal of attention from research workers and public health authorities all over the world because of the gravity of the diseases caused by parasitic worms. To summarize in a convenient form the results of all this research is not an easy task, but the author has made a very creditable job of it.

Part I gives a general introduction to parasitology, which includes a useful historical review of helminthology, and discusses the zoological nature of parasitic helminths and their relations to their hosts and the geographical distribution of the important species which infect man. Part II, which forms the bulk of the book, gives a well-illustrated account of the nematodes, trematodes and cestodes parasitic in man, treating these not, as most textbooks on this subject do, in the sequence of their zoological classification, but according to the organs and tissues which they attack, this arrangement being, the author believes, clinically more convenient. In Part III the clinical and public health aspects of helminth infections are considered in chapters on their diagnosis, treatment and prevention.

The 5 appendices provide a bibliography of key references to books and journals dealing with the subject, a useful chapter on the rules of zoological nomenclature, another on the helminth parasites of common laboratory animals, which adds to the note of comparative helminthology evident throughout the book, a section on the Nematomorpha and Mermithoidea and a final valuable chapter on recent advances in knowledge, in which the author gives,

among other useful facts, recent advances in our knowledge of vectors and anthelmintics.

In the preparation of the manuscript the author has had the help of British, Canadian and American experts whose names are famous in the world of parasitology, so that the book makes its bow with worldwide authority behind it. This is not of course to say that criticism of its text will not be made. There will always be readers of any textbook who will take exception to statements here and there; but these are best left to the expert and teacher to correct according to his opinions and experience.

The 62 line illustrations, most of which consist of several individual drawings and among which are histograms and maps of the geographical distribution of important species, constitute a valuable feature of the book. More than half of them are new and they will help the reader not only to understand the text, but also to identify the parasites and their intermediate hosts. Useful among these illustrations are the silhouettes of the more important parasitic helminths which give, as many other textbooks do, their natural size.

The book is printed in double columns on large, broad pages. It is well printed in clear type and is, in contrast to other textbooks on this subject, delightfully light to handle. *G. Lapage*

It is with deep regret that we record the death on 4th April 1960 of Air Marshal Sir James MacConnell Kilpatrick, *K.B.E.*, *C.B.*, LL.D., M.B., D.P.H., Dean of the London School of Hygiene and Tropical Medicine, who had been a member of the Honorary Managing Committee of the Bureau of Hygiene and Tropical Diseases since 1957.

Printed in Great Britain by The Eastern Press, Ltd., London and Reading